THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XIX. No. 474—22ND YEAR.] LONDON, DECEMBER 6, 1870. [Subscription { 15s. in Advance. / 18s. Credit.] DOUBLE No. Price 1s.

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The above Oxide is now in use at some of the largest works in the kingdom, and has gained a decided preference, owing to its efficiency, cheapness, and the great saving in labour effected by its use.

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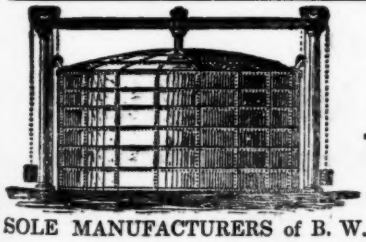

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Analyses by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

Description.	Cubic Feet of Gas per Ton of Coals.	Illuminating Power in Candles.	Coke per Ton of Coal used. Cwt.	Ash in Coke per Cent.	Sulphur in Coal per Cent.
Best Silkstone . .	10,900	17·0	12·8	2·6	1·7
Norfolk Silkstone . .	11,000	15·94	12·5	4·4	1·64
Silkstone Brights . .	11,500	14·5	12·6	7·4	1·85
Silkstone Nuts . .	10,800	15·85	12·66	6·0	0·69

NOTE.—The illuminating power of the Gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

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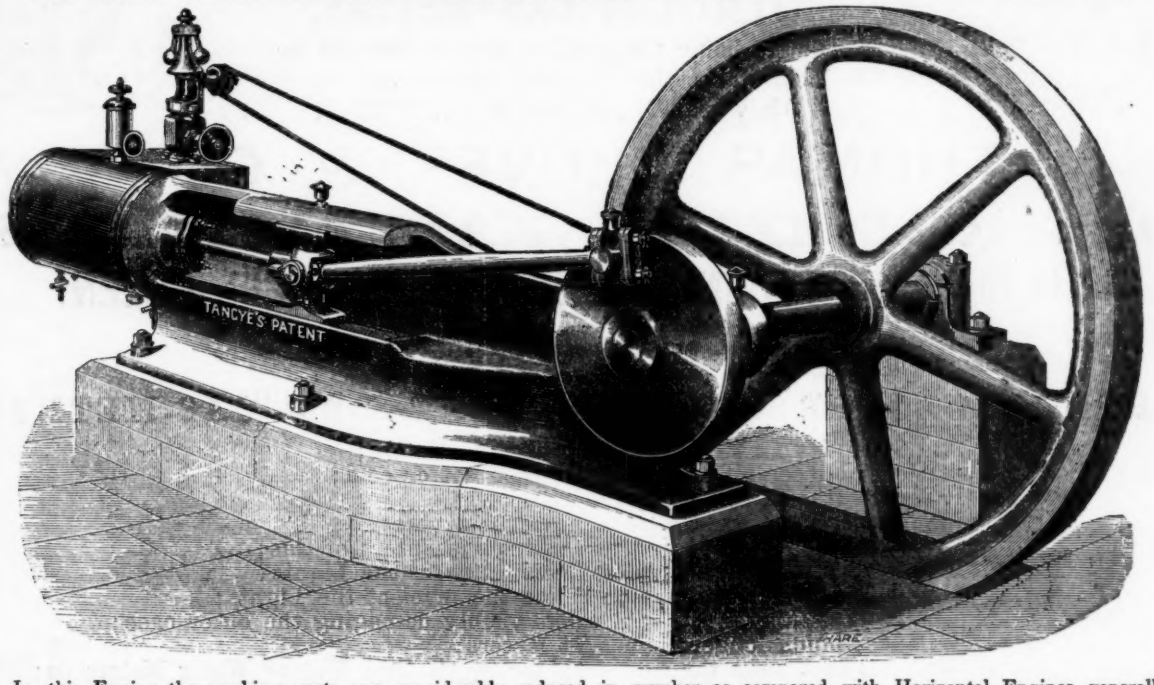
PATENT HIGH-SPEED REGULATING GOVERNOR STEAM-ENGINE.



In this Engine the working parts are considerably reduced in number as compared with Horizontal Engines generally, rendering it far more durable and compact. The bed-plate, front cylinder cover, guides, and plummer-block for crank-shaft bearing are formed of one piece of metal, which in design and proportions is admitted by competent engineers to be perfect, and to afford a strength and rigidity that cannot possibly be attained with the best-fitted Engines of the ordinary horizontal type. The crosshead blocks and all the bearings are adjustable, so that any wear can be readily taken up. The material and workmanship are of the highest class throughout,

The Governor is of a very special description, and combines in the small space usually occupied by the ordinary Steam Stop-valve, a Governor, Throttle-valve, and Stop-valve complete. It is exceedingly sensitive, simple, and compact.

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NOMINAL HORSE POWER	ONE	TWO	THREE	FOUR	SIX	EIGHT	TEN	TWELVE
Diameter of Steam Cylinder	3 in.	4 in.	5 in.	6 in.	8 in.	9 in.	10 in.	12 in.
Length of Stroke	6 in.	8 in.	10 in.	12 in.	16 in.	18 in.	20 in.	24 in.
Price of Engine, with Governor and Feed Pump	**£20**	**£27 10**	**£35**	**£45**	**£60**	**£80**	**£100**	**£120**
Price of Engine and Boiler, with Fittings	£43	£56 0	£84	£100	£135	£168	£205	£235

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Pressure of Steam in Boiler.

The number of gallons required to be lifted in a given time.

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In ordering, state the purpose for which the Pump is required, to ensure suitable valves being sent.

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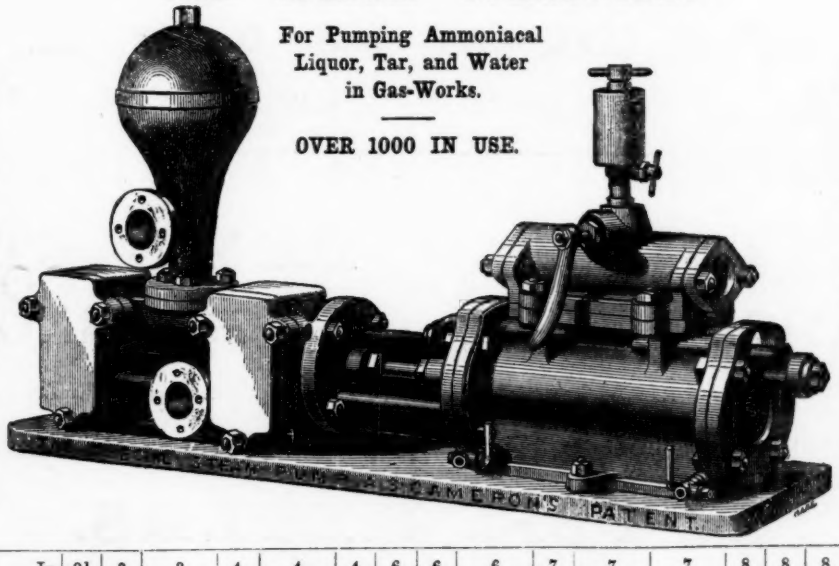
OVER 1000 IN USE.



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All Double Acting.

Works at any Speed, and any pressure of steam.

Will force to any height.

Delivers a constant stream.

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Simple, Durable, Economical.

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PRICE		**£10**	**£15**	**£22 10**	**£20**	**£27 10**	**£35**	**£30**	**£40**	**£47 10**	**£50**	**£52 10**	**£57 10**	**£50**	**£55**	**£65**	**£85**	**£70**	**£80**	**£100**

London, 1851. New York, 1853. Paris, 1855. London, 1862.

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3rd, Incur no loss of Gas by evaporation;
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5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

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(SUCCESSORS TO SAMUEL CROSLEY,)

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EXPERIMENTAL METERS, PHOTOMETERS, GASHOLDERS, &c., &c.

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W. P. & Co. beg to state that they are now prepared to supply Station-Meters with planed joints.

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J. H.—*Ammoniacal liquor has no immediate action on Portland or other similar cements, but we are not prepared to say what the effect of prolonged contact may be.*

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, DECEMBER 6, 1870.

Notes upon Passing Events.

THE Corporation of London, according to the *City Press*—an organ that may be considered an *officious*, if not official, organ—does not expect to be amalgamated or reformed in the course of next session. It is quite possible that political complications may adjourn the fate of the City Corporation, as they did of the Irish Church, for many years, but the end is just as certain. Were reasons wanting for great changes, they could be found in the two last discussions of the Common Council on questions that go to the very root of municipal existence. Mr. Isaacs, according to notice, moved for a committee to inquire into the mode of disposing of the City lands. He got his committee, but the way in which his motion was met showed that the Court of Chancery, in the time of Lord Eldon, was not more in need or more averse to reform—that is, light and responsibility—than the Corporation of London. Mr. Isaacs stated—no one contradicted him—that the unproductive lands, the property of the Corporation, are worth, in round numbers, a million and a quarter, and would produce, if sold and invested, an income of £55,000 a year at the rate at which they are at present borrowing money. He described how houses come into the possession of the Corporation by purchase or the dropping of a lease. The Committee having charge of this particular property fix on a price and rent, and order a board to be put up, offering the same for tender; applications for information to be made to the City Architect's office:

> Persons desiring to tender for the property go to the architect's office and ask the particulars. He knew that when they had so attended, owing to the multiplicity of the architect's engagements with this or that committee, they have not been enabled to see the architect. They have called again and again, but have been unable to see him. Perhaps those persons do tender, and perhaps they do not. He would presume that a given number do, and that the appointed committee proceed to open the tenders. The highest tender (for illustration) he would say was £500. The architect's estimate of the value is £600. Well, what do the committee do? He asked the court to observe this. They say—to the detriment of the Corporation, and in opposition to what they would do if the property were their own—Your offer is so far below our architect's estimate of the value, that we must decline it, and they do so accordingly. Those who tender then go about their business, and the committee proceed to the next business on the paper, the question of the property being relegated to the limbo of oblivion. Meantime, mischievous urchins in the neighbourhood amuse themselves with breaking windows, and so on, while the dishonest ones steal what is worth carrying away. In the result the property is voted a bore by the neighbourhood. By some means complaints reach the committee, who resolve to pull down the property, and let the site *per se*. What follows? The committee go over the whole business, with just a little modification in the order, and a slight alteration in the board that is fixed to the property, and if there were any tenders they were opened. What was the result? The highest tender this time was considerably below what the highest tender was on the former occasion, and, of course, shared the same fate. Persons tendering again go about their business, and the committee again proceed to the next business.

The tendering system is carried out under a pretence of secrecy—the reserved price being a profound secret in the breasts of a large committee and a number of officials. Mr. Isaacs's line was to conciliate, therefore he did not ask why, when the Corporation had the New Meat Market, with its valuable public-houses, to let, the tender system was put on one side, and the rule that kissing goes by favour openly avowed and practised—a member of the Common Council receiving as a reward of his doings and sufferings a public-house for £500 a year, where open competition would have produced at least £1000 a year. The fact is that the Corporation of London, unlike the Corporation of Liverpool, or the managers of the vast building estates of the Marquis of Westminster or the Duke of Bedford, make the sale or lease of a property a favour conferred, not a matter of mutual profit. You must work as hard as if you were getting a contract from a Government department, if you have no friend at court, and want to build a shop or a warehouse on City property. The effect on the City finances was extremely well painted in a financial form in the following examples and calculations:—

> A certain site belonging to the Corporation was, in 1867, advertised on a building lease; £590 per annum was offered for that property. It was declined. The estimated value of the property was—as he believed it was now—£600 per annum. It still remains unproductive. The loss to the Corporation was 3½ years rental at £590. They would find that would amount to £2665. The interest on that sum, at the present rate of interest (exclusive of compound interest, which was important, especially when several years came into the reckoning) would be £70. Therefore this property, if let to-morrow at the estimated value of £600 per annum, would be less productive to the Corporation than it would have been if it had been let in 1867 at £590 per annum. This would be so, even if it had been let at £500 per annum. Reckoned by compound interest, the figures would be more startling, because, if they had a property, and they were disposed to let it, with the option of purchase at twenty-five years, and reckon money at 4 per cent. per annum, the first two years would represent, not, as one would imagine, 8 per cent., but 9 per cent., and the first three years it would represent 13¾ per cent. If the property was likely to remain unlet for ten years (and they had some that had been so for sixteen years) then they had better let their property at £60 a year at once—that was taking money at 4 per cent. and twenty-five years' purchase—than keep it for ten years and then let it at £100, to say nothing about persons declining to come to live in the neighbourhood if there was a good deal of property about which was unlet. The vacant land in connexion with the Metropolitan Meat and Poultry Market would continue in the present state unless they took the bull by the horns. Well, the value of that was £200,000, and for the Newgate Market site say £60,000. He could hardly form an idea of the money value of the land in connexion with the Metropolitan Cattle Market, but he could tell them—as indeed the returns would tell them—that it represented 18½ acres.

No one attempted to contradict these statements or to upset these calculations, but they carped at the motion in the style of the Bishop of Winchester's favourite old Irish woman who could not lend her washing-tub "becase I've not got it, and all the "hoops are off; and don't ye see, ye aggravating crater, I am

"using it myself?" Some did not object to the motion, but only desired to shelve it by appointing a conference of all the Corporation's committees. Others agreed with the motion, but objected to the details, holding the ostrich-like notion that Corporation credit depends on secrecy. Had no details been given, they would have objected to the motion. Others occupied time, after assenting to the motion, in proving that matters were so exceedingly well managed that no one was to blame. Others protested against alteration that would interfere with the patronage and power of the committees in respect to the vacant land of separate improvements. Mr. Alderman Lawrence alone was the bold builder, and could see no reason for any alteration in a system that suited gentlemen in his position perfectly well. Can we imagine the City Architect or any other Corporation official keeping an alderman and M.P. waiting one moment in an ante-chamber or for a question? It really is astonishing how Conservative a man may be in his own little domain, although an advanced Liberal in politics and religion. A million and a quarter of property deserves an office to itself, with clerks, an officer—whether called surveyor or architect—with nothing else to do, say from ten to four o'clock, but give all possible information to applicants for land in the most civil manner, and to report the offers to a committee sitting from day to day ready and anxious to let or sell. The economy of making the same officer designer of markets, libraries, and seller of vacant land, is a truly City delusion. It might not be amiss to commence with a sale by auction, where, before the biddings closed, the auctioneer should announce the upset price. If that were not obtained, the plans and conditions would go to the City sale office. At any rate, City red-tapery should be swept away, and real business substituted. They want a City Childers in the Council Chamber. Unfortunately the Corporation, much too numerous, is divided into a series of large standing committees, which inherit the most dilatory traditions. Nothing but a large reform besom will alter the slow and stolid ways, for, as a City poet profanely sings—

The slime of the turtle is over them all.

The next discussion was still more significant of the aversion of the Corporation to "facts and figures" throwing any real light on their financial position. Mr. Cockerell, another new broom, proposed to appoint a professional accountant to consider whether any improvement in keeping the Corporation accounts could be adopted. He was under the impression that the present (mysterious) form had been settled ten years ago. Since that

They had been carrying forward enormous works, and had been borrowing very large sums, tripling their bonded debts. They had a duty on coal of 13d. a ton. They had to dispose of that in this way—4-13ths to themselves, and 9-13ths to the Board of Works. There was no statement of the gross amount received, but they had five accounts, and not one giving a statement of the gross proceeds. They should be able at a glance to master these accounts. If they desired to know the salaries of their officers, it was necessary to move a resolution, and the matter would be referred to the Officers and Clerks Committee, to bring up a report. They could not find it in the Chamberlain's published book without enormous labour. They were charged all over the book. They should be able to know at once what they were paying their officers. They had a right to expect a balance-sheet. Let there be separate accounts, one for the City lands, one for the bridge house estates, and so on. That would simplify the matter, and make the accounts intelligible to the members of this council. He had a report there signed by himself, on the statements of the Chamberlain. It stated that they had only been able to pay off on the City's coal-tax £50,000 of their bonds; £26,000 of that was provided out of the City's cash, and he was not aware of the fact at the time of the preparation of the report. He had taken the statement of the Chamberlain. They should not be placed in such an unfavourable position. There was an estimated deficiency of £4000 on the assets and liabilities of the Corporation, and, upon taking that statement from the Chamberlain, he was flatly contradicted by an alderman, and he asked the Chamberlain if he was right, and he said, "Well, there is a deficiency of £4300, but I have some interest coming from the Chatham and Dover Railway." They had no balance-sheet at all, and why should there not be? They paid £212,000 for interest of borrowed money, but they should have an account at the bank enabling them to get a large sum of the money at the bank rate of interest.

Mr. Chamberlain Scott, the only person who really knows how the Corporation balance-sheet, if made out, would stand, had nothing to say against the necessity of a true and intelligible account. On the contrary, he declared that the system dated from 1838, or thirty-two years, and that his proposal in that year to the same effect had been rejected. He repudiated the idea of professional accountant, because "the funds were regulated by "more than one hundred Acts of Parliament." Could there be a stronger argument for consolidation? Of course the Chamberlain did not approve of the loans from bankers, which every railway company's manager that understands uses with discretion. Mr. Bedford went right to the marrow of the matter. He said:

Mr. Cockerell was right in saying that there was no balance-sheet in which the various balances were brought forward and accounted for; but there was something worse—there was a balance-sheet called "*cash assets and cash liabilities.*" The cash assets comprised the Metropolitan Cattle Market, which was a *yearly loss to the Corporation of some thousands.* Then there was the Metropolitan Meat Market under the head referred to, and that was a loss of £8000 *or* £10,000 *a year* to the Corporation. In 1868 the balance shown by this balance-sheet was £608,000. In the following year, without any earthly reason, it dropped to £498,000. There was a loss of £107,000. But how was this? There was nothing in the accounts to answer for it. Only two years ago the balance was £398,000. Last year it was increased by £120,000, which would seem to show the Corporation was £124,000 richer, whereas they were £35,000 poorer than they were last year. He said that this balance-sheet was a misleading one. Referring to the Meat and Poultry Market account, what did they find there? The receipts there are for thirteen months, but the payments (and they were for large sums for interest) were for six months, making what appeared a surplus of £6000 an actual deficiency of £5000. He said they should have a statement showing the receipts on one side and the payments on the other. He objected to a balance being brought forward on the receipt side; he wanted both sides explained. There was another point, and it was a very strange one. They actually borrowed money for the purpose of investing it. They advanced money out of their reserved fund to enable the committees to carry out their works; and then they borrowed money from the public for the committee to pay back into the reserved fund what the court then invested. That was a gross mistake, but the principal thing they had to devote their attention to was this: Were the accounts as set out such that any intelligent man could understand? He said that there were not half a dozen gentlemen at the court who could say that they had examined their accounts and could thoroughly understand them. They wanted their accounts stated intelligibly, and the question would not rest until this was done.

But arguments have no effect on the advocates of secrecy, and the previous question was carried.

It should be remarked that Mr. Justice Patteson and Sir George Cornewall Lewis, as commissioners for inquiry into the Corporation of London, both insisted on the necessity of plain accounts and an official auditor.

The month of November, 1870, will be noted in the future annals of England's history as the date when the first Educational Parliaments were elected—the first time that public Boards were formed for the purpose of suppressing elementary ignorance. We must not expect too much from the first Boards; they must have time to shake into shape, and to let the electors weed the mere talkers from the real doers—the persons who merely seek notoriety from those who are capable and earnest. A sort of ballot has been tried, and produced an external calm which will have a powerful effect in forcing the same system on parliamentary elections. But there must be something in Anglo-Saxon blood that prevents the race from conducting elections with the calmness common amongst other European people. Why some wealthy people, who never before took the slightest interest in education, should suddenly become so zealous—should even issue addresses in which all the rules of grammar and composition are set at defiance—and spend (but this is not so extraordinary) large sums to obtain the object of their new-born ambition, we cannot imagine. In one metropolitan parish it is reported that seven candidates have spent over seven thousand pounds. We dwell on the wretched English of certain rich candidates. The working men's addresses were generally well—that is, clearly written. It will certainly do "Pomp" good to sit at the same Board with a hard-headed mechanic and an acute woman, and hear his very positive opinions met by opinions just as positive. In regard to the candidates recommended by purely sectarian or purely breeches-pocket interests, we are indebted to the Rev. T. Binney, a celebrated Dissenting minister, for an illustrative story worthy of Rowland Hill's (the preacher, not the Post-Office Secretary) best days. A Dissenting minister, who lived when home brewing was the correct thing in middle-class families—before railways and Burton beer abolished all tubs except washing-tubs—was very particular about his beer. One day the itinerant artist who served the district by going from house to house to superintend the operation, died. The reverend gentleman anxiously inquired amongst his congregation for a successor. A man was recommended to him strongly as a zealous Sunday-school teacher, powerful in prayer-meetings and love-feasts. "Ah, yes," said the reverend beer lover; "that is all very well, *but can he "brew?*" At first we must expect to find a good many on the new Boards with every sort of qualification except being able "to brew." The public which takes an interest in education will have to be reminded, in the midst of all this new-born enthusiasm, that these School Boards are only created to provide elementary education—the mere knives and forks of learning. We shall not place our youth in a proper position until we place within reach of all who desire to learn, from the ambitious national school boy to the adult mechanic—from the sons of the middle class to the sons of that class now educated at public schools—the means of acquiring a thoroughly scientific education. We do not dream of forcing unwilling beasts to drink; but we claim for those who have a thirst for higher education, central halls and laboratories and free schools where they may pursue all that is taught in the higher schools of France and Germany. The result of the elections for the metropolis is, on the whole, satisfactory. Every class is represented. Women of mark have been at the head of the poll in more than once instance. Roman Catholics are fairly represented; and, although some of the more prominent and intelligent amongst the working-class candidates have been rejected, at least one enthusiastic advocate of universal compulsory education will have a seat in the person of the chairmaker Lucraft. The truly great schoolmasters have all been successful. It is plain that the system will work well. We should be curious to see how the ladies will get on with such an overpowering person as Mr. Hepworth Dixon, himself a very creditable and successful example of self-education. Yet, if

he had been a grocer grown into an alderman, or the son of a poor Scotch baronet, he could not have a more overwhelming idea of his own importance. But Boards soon bring the most bumptious to their bearing. In spite of these bright prospects, those who expect England to rival Germany in general book-education will be disappointed. The same influences that make better officers of the German nobility than of our wealthy and aristocratic soldiers, make literature of more practical importance in Germany than in England. Mr. Grant Duff pointed out, in a speech the other day, that Germany has in her Junker class noblemen so poor that they are obliged to farm their own land, and so proud that they like no other occupation than that of a soldier. Their agricultural occupations accustom them to the details of country life—their hopes of pay and promotion rest on close attention to military duties. Hence a zeal unknown in England, where the army is chiefly valued as an amusement, a social distinction, and a mode of displaying wealth. In like manner in Prussia he who is "not born" has two roads to power and distinction which place him above the greatest merchant or manufacturer. He may become, if distinguished in literary studies, an official, and make wealthy citizens wait in his ante-chamber, and submit without argument to his decrees; or, if he has the needful genius, may become a professor, and be ranked only next to a Von. This will never be in England. A man who succeeds in England either wishes to be a "gentleman," or to make his son a gentleman. Money and manners, without a pedigree, will make a successful family, in one generation, *gentle* and even noble. The prizes are not the same in the two countries. We may make our military men learn their trade or leave the army, but we see no prospect of making a Custom-House officer a subject of respectful veneration, and a professor of metaphysics only a little lower than the angels. There has been a good deal of stuff talked about thinking bayonets. The discipline of the German army is the great source of its success, and that discipline insists that the carriers of bayonets shall not think at all. Special intelligence is the result of special education, but that does not mean book-learning. Whenever were more intelligent men in their way to be found than the British sailors, whether in a storm, or a wreck, or on a desert island? Jack is not often book-learned, but he gets his education in the world of practice and facts. An army of men who could and did read would be intelligent enough, if properly taught and disciplined, without taking the physician from his chair, the schoolmaster from his desk, and the chemist from his laboratory.

Circular to Gas Companies.

By the report of the last meeting of the Metropolitan Board, printed in another column, it will be seen the Board of Trade have expressed their willingness to take entire charge of the proposed Bill to amend the Metropolitan Gas Acts, and that the Metropolitan Board have resolved not to proceed with the Bill for which they had given notice. The matter is now, therefore, left in the hands of the Board of Trade, who, we believe, intend to bring in a public Bill to carry out the alterations they propose. Until the Bill is printed it is impossible to know exactly what are the intentions of the Board, but if the notice which we printed in our last accurately expresses the objects aimed at by the secretary of the Board—for in the absence of the president the functions of the Board are exercised by him—the measure threatens to be one of a sweeping and almost revolutionary character. The notice given points to the complete abrogation of all previous legislation in respect of the metropolitan gas companies, from the City of London Company's Act of 1817 to that obtained by the Chartered Company this year. It further proposes to bring under one and the same set of regulations the companies supplying the most densely inhabited parts of the metropolis and the companies supplying suburban districts, specially, and for good reasons, exempted from the operation of the Act of 1860. The first object which appears to be aimed at is the amalgamation, by compulsion or agreement, of the companies. We are far from saying that within certain limits amalgamation is not a desirable object, but we may remark that it is a process gradually going on without any interference from the Legislature, and will undoubtedly proceed without any such interference. That part of the notice relating to the alteration of the limits of the districts of the companies is too vague to enable us to guess the intentions of the promoter of the Bill, but it will probably turn out that it is simply desired that the sanction of the Board of Trade shall be necessary for any alteration of limits proposed by the amalgamating companies themselves. If all the companies be united into one, as is suggested by the notice, or even into two, separated by the Thames, no difficulty can be experienced in fixing the districts. How far it is proposed to interfere with the existing rights of share and stock holders in the various companies it is impossible at present to say; but here again we may remark that, in the amalgamations which have already taken place, these have been arranged so as to satisfy all the parties interested.

The proposal to regulate and improve the quality and illuminating power of the gas to be supplied in the metropolis and adjacent districts, is one which will have to be dealt with in a committee, when it will be for the companies once more to show what quality of gas they can supply for a given price. We observe that no notice is here given of an intention to exact uniformity in price, which is so far reasonable. What means of improving and regulating the mode of testing the illuminating power and quality of the gas will be proposed it is impossible to say; but it would seem that the Board of Trade is as dissatisfied with the present system as the Chartered Company. As regards the cost of the testing, which it is also intended to provide for, we may remark that at the present time the gas companies and the local authorities are very unequally taxed for the purpose, and some redistribution of the expenses is advisable. So far as regards the remainder of the notice, it may be looked upon simply as an expression of the intention to bring all the metropolitan companies under regulations similar to those imposed upon the City companies by the Act of 1868. If the object were to bring in only the companies not affected by that Act, but included in the Act of 1860, the letter of Mr. Barber, read to the Metropolitan Board, shows that probably no great opposition would be made; but if it be intended to subject the suburban companies to precisely similar provisions, they will certainly defend themselves.

It will be seen by the report of the last meeting of the Metropolitan Board, which we print, that an innocent attempt was made by one of its members to obtain the insertion in any Bill relating to the supply of gas, of a provision securing for metropolitan improvements such surplus profits of the companies as may remain after payment of the statutory dividends. Such a suggestion, it might have been thought, would have been favourably received by the Board; but, in fact, the scheme was so unpalatable that the proposer asked for leave to withdraw it. The seconder, however, objected to this course, and on its being put to the vote only one hand was held up for it—that of the seconder. The debate on the motion was valuable, inasmuch as it has shown that there are, even on the Metropolitan Board, gentlemen who, with every desire to promote what they consider reform in gas matters, can still appreciate the different conditions of London and Manchester, so far as the cost of the manufacture and distribution of gas is concerned.

We are enabled to state that in the agreement for the amalgamation of the Equitable with the Chartered Company, it is arranged that the shareholders in the former shall be guaranteed their full dividend of 10 per cent. Such an arrangement, of course, supposes that no alteration will be made in the limit of dividend payable by the Bill we have referred to above.

It will be of interest to many of our readers to know that the great works of the Chartered Company at Beckton were successfully put into operation on Friday, the 25th of last month.

In spite of the Gas and Water Facilities Act, the notices of applications to be made to Parliament by gas companies in the ensuing session exceed by eleven the number of applications last session. The notices for gas Bills are forty-five. Besides these, there are fifteen notices of applications by gas companies to the Board of Trade under the above-mentioned Act; making in all sixty notices as against thirty-four in the past session.

We may notice here the issue by the Board of Trade of a set of rules for the guidance of such persons or companies as wish to avail themselves of the Gas and Water Facilities Act. The Act itself, and the schedules appended, will be found at page 613 (Aug. 16, 1870); but the rules now printed are intended to give more precise instructions as to the mode of procedure. In addition to the rules, the Board furnishes a model plan for gas-works, and requires that any plan proposed should be as near as possible in accordance with their example, as no doubt it will be, if the applicants are so fortunate as to be able to secure a plot of ground, as the site for the works, with a railway on one side and a canal on another.

The meeting of the Imperial Continental Gas Association calls our attention to the state of gas affairs on the Continent. When first the war broke out, and it seemed probable that Frankfort, Berlin, and other German cities would fall into the hands of the French, the shares of the association suffered a temporary depreciation in value. Now, however, that all the works of the association appear to be safe from attack (for it is hardly probable that under any circumstances the Germans will go so far south as Bordeaux), and after the very favourable report presented to the meeting the shares will, no doubt, rise to their former price. At Strasburg, great progress has been made in the reconstruction of the works belonging to the Continental Union Company, and it is expected that they will soon be in full operation. Montargis,

where the same company have works, has been occupied and evacuated by the Prussians without, so far as we have heard, any damage being done to the gas-works, or any interference with the supply. The evacuation of Amiens by the French troops relieves the works of the European Company there from present danger, though they are within range of the guns of the citadel, and might receive damage if the French made an attempt to drive out the Prussians. Rouen and Havre, however, appear to be in great danger; but it seems at the present moment more than probable that if either of these places were seriously menaced they would be evacuated by the French troops just as Amiens was. In Paris gas affairs are gloomy in the extreme. The stock of coal is said to be exhausted, and the small quantity of gas made is produced from the green wood of the trees cut down, to which illuminating power is given by the use of petroleum. Even the supply of such gas to private consumers was suspended on the 30th ult., and of the street-lamps only one in four is now lighted.

Walsall is an example of a town in which gas affairs do not appear to thrive under the management of the local authority. The fact that the commissioners under the Walsall Improvement Act, in whom the gas-works are vested, are about to apply to Parliament for power to borrow money in order to extend the works, has called public attention in the borough to the matter, and produced some severe strictures on the management of the commissioners. From the discussion, so far as it has gone, we gather that the gas supply is carried on, not exactly at a loss, but with very small profit, and that profit, according to the town-clerk, can only be applied to the extension of the works. In former times, however, it would appear that some small sums had been paid out of the profits to the rating account of the borough and ratepayers naturally wonder why the same cannot be done now. The answer may possibly be found in the circumstance that gas is supplied to large consumers in Walsall at 2s. 2d. per 1000 feet, a price which can leave but little margin of profit; and the ratepayers can hardly expect to have gas at cost price, and profits to be paid in aid of rates. We are far from saying that the management of the commissioners is perfect; it is very unlikely that it can be so, especially if millions of feet of gas can be wasted, and the fact not be discovered until months after the loss. That the profits, small as they have been, have really been applied to their legitimate use, would appear from the statement that the works, which in 1858 were worth only £12,000, are at present valued at £40,000; and it is hastily concluded that they ought now to produce £4000 a year for the Corporation. They might do so, of course, with gas at a proportionate price; but the ratepayers at Walsall cannot have their cake and eat it also. The commissioners at Walsall seem to have achieved in their management what Mr. Dresser Rogers and some other members of the Metropolitan Board would perhaps regard as perfection—namely, the supply of gas without divisible profit.

In another place will be found a paper by Mr. Stimpson, of Boston, "On Farmer's Theorem." The author's disagreement with Professor Silliman as to the correctness of the theorem has been mentioned before (page 60), but in the paper now printed from the *American Journal of Science and Arts*, he brings what he considers arithmetical proof that the theorem cannot be sustained. Readers who compare the calculations by Professor Silliman, given on page 60 of this volume, with the calculations of Mr. Stimpson, will be astonished at the extraordinary differences arrived at by two gentlemen applying the same theorem to the same set of experiments. It will be seen that Mr. Stimpson's calculations, applied to the experiments of MM. Audouin and Bérard, make the arithmetical results by the old formula approximate very closely to the experimental results, while the calculations by Farmer's theorem diverge very widely; Mr. Silliman's figures, on the contrary, seem to support the theorem. We cannot here attempt to reconcile or explain the differences, but we may express our perfect agreement with Mr. Stimpson when he says that it is desirable that experimenters should turn their attention to the matter of the relation of consumption of gas to illuminating power, and we have no doubt that the papers by Mr. Pole we have published have already set many experimenters at work both in this country and in America.

In the paper by Mr. Stimpson we publish, the remark is made that the assumption of Mr. Silliman that the true candle power of a rich gas can be obtained by mixing it in definite proportions with a poorer gas of known illuminating power, and deducing from the observed power of the mixture the candle power of the rich gas, is not proved to be correct. This proof Mr. Silliman now endeavours to give in a paper we print "On the Determination of the Photo-" metric Power of a Rich Gas by Dilution with a Poor Gas of " known Value—the 'Method of Mixtures,'" a copy of which he has kindly sent us in advance. In this paper the author details some experiments made with mixtures of rich with poor gas, and also with a neutral gas—hydrogen—which seem fairly to establish that the "method of mixtures" gives reliable results.

With the present number of the JOURNAL our subscribers will receive the twelfth of the series of working drawings of the Chartered Gas-Works at Beckton. It is proposed at an early date to complete the series by giving a supplementary sheet containing drawings of the side and end elevations of the retort-houses. In answer to inquiries on the subject, we have pleasure in stating that a few copies of the entire series have been reserved for binding, and will shortly be published, handsomely bound in crimson cloth, gilt, with full letter-press description of each of the drawings.

Correspondence.

INSURANCE OF GAS-WORKS AGAINST FIRE.

SIR,—Several inquiries having been made to me, since you published the report of our last general meeting, as to the name of the company in which these works are insured against fire and explosion, and the coal against spontaneous combustion, and as it will be of interest to many of your readers to know, I beg to state that it is the "Law Union Fire and Life Insurance Company," and that on application to Mr. Frank M'Gedy, the secretary, at that company's offices, 126, Chancery Lane, E.C., every information on the subject of insurance will be given. MAGNUS OHREN.

Crystal Palace District Gas Company's Offices and Works, Lower Sydenham, S.E., Nov. 23, 1870.

EXHAUSTER GOVERNORS.

SIR,—Had Mr. Whimster, of Perth, done me the justice of endeavouring to understand my plan of exhaust governing, instead of being so generous in his condemnation of it, he could hardly have "failed to see" how essentially it differed in principle from that of "Inquirer."

Mr. Whimster says of my plan: "But in order that the throttle-valve be maintained in this position, there *must be a pressure* on the hydraulic main; and, therefore, this plan fails on principle just as the other." Now until we exhaust at a vacuum of 15 lbs. on the square inch, there will always be pressure on the hydraulic main, so that I cannot quite follow Mr. Whimster here. But if he mean that there must be an *increased* pressure, I must ask him why; and, further, how I am to discover it, as I have failed to find anything of the sort in the action of some dozen of these governors that have been some time at work under my own observation. If the gas-holder be properly balanced, there can be no more pressure from its being a few inches higher or lower in the tank.

In reply to Mr. Whimster's dogma, that "the principle which is at fault is that of causing an alteration in the pressure on the hydraulic to affect the speed of the engine," I have only to say that what he describes as "faulty," I should consider the very perfection of any instrument contrived for the purpose of maintaining a uniform exhaust, as the engine is so made to immediately counteract any variation.

Mr. Whimster's apparatus only accomplishes in a more complicated and difficult manner what Wright's exhauster bye-pass does very effectively—viz., it prevents the exhaust rising too high by causing the gas to be passed through the exhauster a second time, and so allows the engine to work considerably faster than necessary, only *restraining* the exhaust within the adjusted limit. Anything more barbarous, from a mechanical point of view, than that an engine and exhauster should constantly be driven for a "considerably" larger volume of gas than is made, I cannot conceive, and I can only admit that Wright's apparatus for this purpose is inferior to Mr. Whimster's because it (Wright's) is simpler, and therefore more efficient in this very mischievous method of action.

Again, Mr. Whimster says that his bye-pass will "*maintain*" any adjusted pressure on the hydraulic main under "*all variations* of steam pressure."

Will he kindly point out what his apparatus does to "maintain" the exhaust under the following conditions?

Let his engine be working 10 per cent. faster than necessary, and the bye-pass consequently allowing 10 per cent. of the gas to repass to the inlet of exhauster (this I understand to be his *modus operandi*). Now assume that the steam pressure "varies" by falling off 12 per cent., what becomes of the "maintenance" of a uniform "pressure or vacuum"? How does his bye-pass *make up* for the 2 per cent. loss of exhaust?

If Mr. Whimster will relegate his bye-pass to the scrap heap (where it will fulfil a higher duty than it performs in the engine-house), and fix his small gasholder near the engine, connecting it with the throttle-valve lever, and adjusting the balance-weight until the desired exhaust is obtained, he will find that exhaust maintained constantly, no matter how the make of gas may increase or decrease, nor to what extent, within reasonable limits, the steam pressure rises or falls.

Apologizing for intruding on so much of your space, permit me to subscribe myself HENRY E. JONES.

Ratcliff Gas-Works, London, Nov. 30, 1870.

THE SULPHUR QUESTION.

SIR,—From the fact of the gas referees not having yet determined the maximum quantity of sulphur to be allowed in 100 cubic feet of gas, it is evidently a very difficult question to settle, and the difficulty will be strikingly illustrated when I state that out of eighteen different coals tried here during the last two years, only three of them gave less than 20 grains of sulphur, the others varying from 21¼ grains to 50½ grains in 100 cubic feet of gas, and this with

ample scrubbing and purifying power. The trials were all made with such quantities of coal as would afford at least four days consecutive working, and the sulphur recorded is in each case the average result of three examinations of 24 hours duration each with the Letheby apparatus. Now, several of the coals showing a high rate of sulphur give far better results in yield of gas, illuminating power, &c., than those coals which show *less* than 20 grains; and as quantities far higher than the present maximum are proved to have no injurious effects when consumed, it may fairly be asked whether gas companies are to be restricted by legislative enactments to the use of a very limited number of coals, in several respects not so suitable as many others. The effect of this would be to establish a monopoly in a small number of coals for gas-making purposes (which it is evident could not possibly be maintained), and it seems to me that the sulphur clause should be entirely struck out unless (or until) the gas referees are able to show that the quantity can be kept below 20 grains in 100 cubic feet of gas made from *any* coal, and this not by laboratory experiments, but by practical and commercial operations.

C. TADMAN.

Norwich, Dec. 3, 1870.

Parliamentary Intelligence.

NOTICES GIVEN FOR PRIVATE BILLS RELATING TO THE SUPPLY OF GAS AND WATER, AND TO SEWAGE IRRIGATION.

ABERDARE GAS.—Repeal of Deed of Constitution of Aberdare Gas Company, and reincorporation of that company; supply of gas to Aberdare and surrounding district; power to acquire and hold lands, and maintain, improve, and construct gas-works; money powers; agreements with district boards and others; power to Aberdare Local Board of Health to acquire gas-works; amendment of Acts.

ABERDEEN MUNICIPALITY EXTENSION.—Provision as to supply of gas to the city and suburbs, and places adjacent thereto; power to the Town Council to purchase undertaking of gas company; and also for the manufacture, storeage, and utilization of residual products; and other purposes.

ABERDEEN CORPORATION GAS.—Purchase of lands, by compulsion or otherwise, and erection of works by the Town Council of Aberdeen for the manufacture and storeage of gas, and also the manufacture and storeage and utilization of residual products; power to maintain gas-works, &c., within the city and royal burgh of Aberdeen and the suburbs thereof, and places adjacent thereto; power to divert, alter, raise, or lower roads, bridges, &c.; to levy, collect, and recover rents, rates, and charges for the supply of gas, residual products, &c., and to borrow money; amendment of Acts; and other purposes.

ABERDEEN GAS.—Incorporation of company with powers to maintain and extend existing works, and light Aberdeen and other places with gas.

ALLIANCE AND DUBLIN CONSUMERS GAS.—Amendment or annulling of agreement between the company and the Corporation of Dublin, and exemption of gas-works from certain municipal taxes during agreement; amendment of company's Act as to testing of gas and storeage works; arrangement of capital; provisions as to consumption of gas and recovery of sums due to company; amendment of Acts; and for other purposes.

ARBROATH CORPORATION GAS.—Transference of gas-works and undertaking of the Arbroath Gaslight Company to magistrates and Town Council of Arbroath; power to maintain, extend, and improve gas-works, and to make and supply gas; limits of supply; power to levy gas rates, rents, and charges, and guarantee assessments, and to borrow money; application of surplus profits from gas-works to public and other purposes; incorporation of Acts; and other purposes.

BARNET GAS.—Incorporation of company; purchase and maintenance of existing gas-works belonging to the Barnet Gaslight and Coke Company, Limited; power to supply gas.

BARNET GAS.—Incorporation of company, with powers for manufacturing gas and supplying the same within the parishes of Chipping Barnet, Ridge, and Shenley, all in the county of Hertford, and the parishes of Monken Hadley, South Mimms, and Enfield, all in the county of Middlesex; power to purchase lands by agreement; power to purchase undertaking and works belonging to the Barnet Gaslight and Coke Company, Limited, and Mr. Edmund Small Cathels, or one of them, and to dissolve that company; to levy rates; arrangements as to capital, &c.; incorporation of Acts; and for other purposes.

BATLEY CORPORATION WATER.—Powers to construct new works for supplying Batley with water; to lay pipes through public and private streets, &c.; to purchase private water-works; to supply water within or beyond the borough, in bulk or otherwise; for sale of corporation's share and interest in the Dewsbury, Batley, and Heckmondwike Water-Works; to apply funds, levy rates, &c.; amendment of Acts.

BECKENHAM SEWAGE.—Powers to Beckenham Vestry to acquire lands for sewage purposes, and to obtain outlet by means of existing sewers; levying rates; and other powers.

BOSTON GASLIGHT AND COKE.—Further money powers; varying limitation of proprietors holdings; alteration of their rights in other respects; provisions as to contingency and reserve funds; amendment of Act.

BRADFORD CORPORATION GAS.—Purchase of lands in the parish of Bradford, by compulsion or agreement, and erection thereon of gas-works, by the mayor, aldermen, and burgesses of the borough of Bradford, in the West Riding of the county of York; acquisition, either compulsorily or by agreement, and maintenance by the said corporation of the existing gas-works of the Bradford Gaslight Company; transfer to the said corporation of the rights and powers of the said company; manufacture of residual products arising from the making of gas; supply of gas by the said corporation to the borough of Bradford; interference with streets and other places for such purpose; power to charge and recover rates and rents for supply of gas, and for the use of gas-fittings; power to levy and recover rates and charges from owners and occupiers of property in Bradford; borrowing of money on security of gas-works, gas-rates, and borough fund and borough rate; variation of privileges and exemption from rates; repeal and amendment of Acts.

BRADFORD CORPORATION GAS AND IMPROVEMENT.—Power to the mayor, aldermen, and burgesses of the borough of Bradford, in the West Riding of the county of York, to purchase by agreement the undertaking of the Bradford Gaslight Company, and to such company to sell their undertaking; transfer to the corporation of the powers incident to the proper carrying on by them of the said undertaking; power to the said mayor, aldermen, and burgesses (1) to extend, alter, and maintain the existing works of the said company, (2) to manufacture and supply gas for public and private consumption within the present gas limits of the said company, (3) to manufacture and sell residual products resulting from the making of gas, and (4) to break up and interfere with streets, and other works where necessary for effecting such supply of gas; compulsory purchase of lands, and construction of works for collecting defœcating, disinfecting, and utilizing sewage; acquisition by agreement of lands for public pleasure-grounds and parks, and making and enforcement of bye-laws with respect thereto; exemption of such places from municipal or other rates; regulations respecting the formation and construction of streets, the erection of buildings, and the sanitary requirements in connexion therewith; extension of time for acquisition of lands for purposes of existing Acts; alteration of period for making up corporation accounts; prevention of nuisances; licensing and regulation of omnibuses and other vehicles plying for hire; imposition of rates; power to borrow money; mortgage of public funds; incorporation and amendment of Acts.

BRIDGWATER WATER.—Incorporation of company; construction of water-works, and supply of water to Bridgwater and other places in the county of Somerset.

BROMSGROVE AND DROITWICH WATER-WORKS.—Abandonment of a portion of works; reduction of capital; extension of time for completion of work; amendment or repeal of Acts.

BURNLEY BOROUGH IMPROVEMENT.—Enlargement of borough; rearrangement and increase of wards; repeal, amendment, and consolidation of Acts; alteration of limits and rents for gas and water supply; alteration of market limits; acquisition and regulation of fairs; improvement of rivers Brun and Calder; providing town-hall, public clocks, libraries, museums, parks, and wash-houses; further powers for sewerage, drainage, and improvement of borough, and paving, improvement, and regulation of streets and buildings; police regulations and sanitary improvements; appointment of paid auditor; bye-laws; purchase, sale, and exchange of lands; new and altered rates and borough-fund; increase of borrowing powers; extension of time for payment of money borrowed; and other purposes.

CAMBRIDGE IMPROVEMENT.—Drainage, sewerage, and distribution and utilization of sewage; compulsory purchase of land; levying of rates and borrowing of money; purification of river Cam; amendment and incorporation of Acts.

CAMBRIDGE UNIVERSITY AND TOWN WATER-WORKS.—Repeal of provisions for supply of water to paper-mills of Cherryhinton Brook, and as to gauges thereon; purchase by Cambridge University and Town Water-Works Company of the estate late Mr. Okes's, at Cherryhinton; provisions affecting their paper-mills estate; amendment of Acts.

CEFN, ACREFAIR, AND RHOSYMEDRE WATER.—Amendment of Act by extension of powers to supply water to other districts; to make arrangements with other water companies; and powers to raise futher capital.

CHESTERFIELD WATER-WORKS AND GASLIGHT COMPANY.—New conduits; additional capital; supply of water in bulk; diversion of footpath; amendment of Acts.

CHORLEY IMPROVEMENT.—Purchase of lands for and power to make sewerage works; to purchase lands for and to erect a town-hall, public buildings, a cattle market, and gas-works; powers to purchase existing market and gas-works, and extend gas-works; election of commissioners; register of owners; bye-laws; auditor; rates; borrowing money; repeal, incorporation, and amendment of Acts; and other purposes.

CLEVELAND WATER-WORKS.—Powers to construct new works, and to extend district; to purchase lands and easements compulsorily; to levy rates and rents; to alter existing rates and rents; to increase capital and borrowing powers; to alter constitution of the board of directors; to repeal existing restrictions, obligations, and penalties; to contract with local boards; to repeal, alter, and amend Acts; and other purposes.

CRADLEY HEATH GAS.—Reincorporation of company, with powers to maintain and extend existing works, and light Cradley Heath and other places in Staffordshire, and Cradley in the parish of Halesowen, and other places in Worcestershire, with gas.

DORKING GAS.—Incorporation of Dorking Gas Company, with powers to maintain and extend works, and light Dorking with gas.

DUNDEE WATER.—New works for additional supply from Melgum, Inzion, and Loch Lintrathen, to Dundee and suburbs, and places adjacent; power to take, compulsorily and otherwise, lands, waters, and streams; power to give off water in bulk to persons, corporations, and public authorities beyond limits of supply; new roads and diversions, and appropriations of existing roads; additional reservoirs, conduits, pipes, and other works, and powers of alteration of old and new works; power to make agreements with landowners and other parties; power to borrow money; rates and assessments; repeal or amendment of Acts; and other purposes.

DUNFERMLINE CORPORATION WATER-WORKS.—Repeal in whole or in part of the Dunfermline Water-Works Act, 1847, and Loch Leven Act, 1827; ratification of deed of transfer of existing water-works to corporation; limits of supply; powers for additional supply, and to take and use Loch Glow and other waters; construction and maintenance of necessary works; powers of compulsory purchase and to levy assessments; power to borrow money on mortgage; and for other purposes.

DUNSTABLE GAS AND WATER.—Repeal of Deed of Copartnership and reincorporation of Dunstable Gas and Coke Company; power to maintain and improve gas-works, and to construct water-works and supply gas and water; money powers; agreements with corporation, local authorities, and others.

EAST NORTHUMBERLAND WATER-WORKS.—Incorporation of company; powers to supply water to the towns, districts, parishes, and places of Morpeth, Woodhorn, Newbiggen-by-the-Sea, Bedlington, Horton, Cowpen, Blyth, Newsham, Cramlington, Earsdon, Tynemouth, Seghill, Killingworth, Dudley, Seaton Burn, Stannington, and other places, all in the county of Northumberland; construction of works; diversion and appropriation of waters; arrangements with and powers to raise and apply moneys to other companies and public bodies; amendment or repeal of Acts; and other purposes.

EDINBURGH AND DISTRICT WATER.—Additional supply of water; power to draw same from St. Mary's Loch and the Loch of the Lowes, and new works for that purpose; repeal, amendment, and alteratian of Acts; new and increased rates; additional powers to borrow; and other purposes.

FOLKESTONE WATER-WORKS.—Construction of new works; additional capital; amendment of Acts.

FORFAR GAS.—Transference, by purchase or otherwise, of gas-works and undertaking of the Forfar Gaslight Company to magistrates and Town Council of Forfar, or other public body; power to maintain, alter, and improve gas-works, and to make and supply gas; limits of supply; power to levy rates and charges, and to impose and levy assessments; power to borrow money; sinking-fund and application thereof; incorporation and repeal or amendment of Acts; and other purposes.

GASLIGHT AND COKE.—Power to company and Great Eastern Railway Company, jointly or separately, to make a short connecting railway or tramway from the company's works at Beckton to the Great Eastern Railway; compulsory purchase of lands; tolls; traffic and other arrangements; application of money; capital powers to company and Great Eastern Railway Company; amalgamation of the undertaking of the Equitable Gaslight Company with the undertaking of the Gaslight and Coke Company; amendment of the City of London Gas Act, 1868, with reference to testing, &c.; and the duties of the referees and gas examiners; capital arrangements; amendment of Acts; and other purposes.

GLASGOW CORPORATION GAS.—Purchase of lands, by compulsion or agreement, and erection of further gas-works by the corporation of the city of Glasgow; power to discontinue gas-works at Townhead; application of money; incorporation and amendment of Acts; and other purposes.

GREENOCK POLICE IMPROVEMENT AND GAS.—Rescinding or altering deed of 1831 between Water Trustees and Town Council as to gas-works and Deed of

Concert of 1827 therein referred to; purchase of existing gas-works; power to Corporation of Greenock to sell, and Board of Police to purchase, existing gas-works; power to Board of Police to discontinue existing gas-works, and to sell and dispose thereof, and existing gas lands, and provisions as to application of money to be received therefor; powers to Board of Police to maintain existing gas-works; to make new gas-works; to acquire lands by compulsion or agreement for that purpose and the other purposes of the bill; and other purposes.

HUDDERSFIELD IMPROVEMENT BILL.—Repeal, consolidation, and amendment of Acts; severance from South Crossland of parts of that township; general powers as to improvement of borough and prevention of nuisances; new streets and improvements; rebuilding of Long Bridge, and contribution of West Riding thereto; compulsory purchase of markets and of property; establishment of new markets, &c.; power to acquire existing gas-works, and to establish inland bonding warehouses; alteration of existing and levying of new rates; powers to borrow money; and other purposes.

HUDDERSFIELD WATER-WORKS.—Transfer to Corporation of Huddersfield of certain powers of Wessenden Reservoir Commissioners; enlargement of reservoir and construction of new works in connexion therewith; alteration of works for distribution of compensation water from Deer Hill Reservoir, and construction of new reservoirs and other works; diversion of waters; extension of water-works limits; construction of new roads, and powers over existing roads; borrowing of money; amendment of Acts.

ILKLEY GAS.—Purchase of additional lands by agreement; new works; removal of test-meter; amendment of Act.

INCE WATER.—Power to the local board of Ince in Makerfield to better supply their district and adjoining places with water, and to enter into agreements in connexion therewith; compulsory taking of lands; compulsory water supply to certain houses; levying of water and other rates and charges; borrowing powers; and other purposes.

KIDSGROVE GAS.—Reincorporation of Kidsgrove Gaslight Company, Limited; usual powers for manufacture of gas and residual products; power to light Kidsgrove and other places with gas.

KILMARNOCK IMPROVEMENT.—Power for better supplying with gas and water the burgh, &c.; power to acquire Kilmarnock Gaslight Company and Kilmarnock Water Company; dissolution of those companies; new water-works; and other purposes.

LAMBETH WATER-WORKS.—New works; extension of district; improved source of water supply; purchase of land; application of authorized capital and loans to the new works; additional powers; extension of rating and other powers of existing Acts to the extended district; amendment of Acts; and other purposes.

LINCOLN WATER.—Authorization of existing works and construction of additional works, and the taking of water from the Prial Brook, the Catchwater Drain, the Upper River Witham, and the Pike Drain, and other waters, and the prevention of the fouling thereof; abandonment of certain authorized works; raising additional moneys; amendment of existing Acts; extension of limits to Canwick and Greetwell; and other powers.

LIVERPOOL IMPROVEMENT AND WATER-WORKS.—Construction of new and widening and altering of existing streets; stopping up of streets and extinguishment of rights of way; construction of open cutting and laying of pipes; construction of conduit; powers to purchase lands; powers to raise money; powers to levy rates; powers to levy increased domestic water-rent outside borough; provision as to application of funds; composition for rates; powers to make bye-laws; provisions for protection of corporation in actions and other proceedings against them; amendment of Building Act and Sanitary and other Acts; and other purposes.

LOUTH WATER.—Incorporation of company; construction of works, purchase of land, capital, tolls, rates; amendment and incorporation of Acts; and other purposes.

METROPOLIS GAS.—Amendment of Acts relating to the supply of gas in the metropolis and adjacent districts; to secure uniformity in the price, illuminating power, and purity of gas; amalgamation of all or some of the metropolitan gas companies, and adjustment of capitals; reducing or altering rates; charges, and dividends of gas companies; regulating future price, purity, illuminating power, and pressure of gas; levying rates; borrowing of money; and other purposes.

METROPOLIS GAS.—Amendment of Metropolis Act, 1866, and of City of London Gas Act, 1868; compulsory amalgamation of existing gas companies; amendment or repeal of Acts relating to those companies; powers for securing a uniform supply of gas throughout the metropolis; alteration of rates and of capital and other powers of companies; and for other purposes.

METROPOLIS SEWAGE AND ESSEX RECLAMATION.—Amendment or repeal of the Metropolis Sewage and Essex Reclamation Acts, 1865 and 1866; alterations of line and levels of existing works; construction of new works; compulsory purchase of lands for works and of Canvey Island; further powers for application and disposal of sewage and irrigation of lands, and to discharge water and sewage into the river Thames; powers to landowners in respect of irrigation works, &c.; rescinding or alteration of agreements of the company and the Metropolitan Board of Works respectively with Messrs. Napier and Hope; provisions as to capital and borrowing powers of the company; return of money deposited with Metropolitan Board of Works; powers to that board to undertake construction of company's works, to subscribe to or guarantee money in aid of company's undertaking, and to raise further moneys, and other powers; extension of time for completing authorized works; amendment of Acts.

METROPOLIS WATER.—Amendments of the Metropolis Water Act, 1852, and of the local and personal Acts relating to the supply of water in the metropolis and adjacent districts; to secure a constant supply of water; the amalgamation of all or some of the metropolitan water companies and adjustment of their capitals; alteration and reduction of rates, rents, charges, and defining dividends of water companies; to secure uniformity in the price and purity of water; purchase by agreement or compulsion and sale of water-works, and providing additional works; power to levy rents and rates, to borrow money, and to create rent charges or other securities; amendment of Acts; and other purposes.

MUSSELBURGH AND DALKEITH WATER.—Incorporation of trustees for supply of water to Musselburgh and Dalkeith, and adjoining districts; new works, and water supply from river South Esk; arrangements between trustees and Dalkeith Town Trustees as to transfer and acquisition of existing water-works at Dalkeith and supply of water there; alteration, amendment, or repeal of Acts; limits of Act and water supply; rates and assessments; power to borrow; and other purposes.

NEWRY BOROUGH IMPROVEMENT AND WATER SUPPLY.—Incorporation of commissioners; transfer of powers from grand juries to commissioners; power to purchase existing gas and water works; supply of water; power to acquire land and raise money; appointment of trustees to execute new water-works; construction of new water-works; supply of water to commissioners, to occupiers of falls on Camlough River; and to Newry Navigation Company; amendment of Acts.

NORTHALLERTON BOROUGH GAS.—Incorporation of company for carrying on existing gas-works, with powers to light Northallerton, Romanby, and Brompton with gas; powers to Northallerton Local Board of Health and other local authorities.

NORTHAMPTON EXTENSION AND IMPROVEMENT.—Repeal and amendment of local Act; further powers for sewerage, drainage, and improvement of borough, and paving, improvement, and regulation of streets and buildings; stopping up and diversion of paths and roads; new streets and improvements; transfer to Northampton Improvement Commissioners of Northampton Water-Works Company's and Northampton Gaslight Company's undertakings, dissolution of companies; sewer authority; utilization of sewage and formation of works, and acquisition of land for that purpose; bye-laws; erection and maintenance of a fire-engine station and brigade; transfer of powers to Corporation of Northampton; powers to raise money and for rating; extension of limits, extension of time for payment of money borrowed; purchase, sale, and exchange of lands; incorporation of Acts; and other purposes.

PERTH GAS (NEW WORKS, &c.).—Incorporation of commissioners; purchase of land, by compulsion or agreement, and erection of gas-works by commissioners; purchase by agreement of existing gas-works; power to maintain gas-works, &c., and to manufacture and supply gas, residual products, meters, &c.; power to divert, alter, raise, or lower roads, streets, bridges, sewers, &c.; rates and assessments, rents and charges; borrowing powers; incorporation of Acts; and other purposes.

PERTH GAS (PURCHASE OF EXISTING GAS-WORKS, &c.).—Incorporation of commissioners; purchase and transfer, by compulsion or agreement, of gas-works, and property of the Perth Gaslight Company, and of the Perth New Gaslight Company; winding up and dissolution of the companies; power to maintain gas-works, &c., and to purchase compulsorily additional lands; power to manufacture and supply gas, residual products, meters, fittings, &c.; power to divert, alter, raise, or lower roads, streets, bridges, sewers, &c.; rates and assessments, rents and charges, &c.; borrowing powers; incorporation of Acts; and other purposes.

POTTER'S BAR GAS AND COKE.—Dissolution and reincorporation of Potter's Bar Gas and Coke Company, Limited; regulation and increase of capital; supply of gas within the parishes of South Mimms, Enfield, and Monken Hadley, in the county of Middlesex, and Chipping Barnet, North Mimms, and Northaw, in the county of Herts; power to levy rates, &c.; agreements with local boards and other public bodies; purchase of undertakings of, and amalgamation with, Barnet Gaslight and Coke Company, Limited, and East Barnet Gas and Water Company; dissolution of those companies; amendment of Act.

RHYL DISTRICT WATER.—Amendment of Act; revival of powers; extension of time for completion of works and compulsory powers of purchase of land; grant of new powers for compulsory purchase of additional land and completion of works; confirmation of works already executed, with deviations from the original plans and sections; increase of capital and extension of borrowing powers; amendment of provisions as regards rating; and other purposes.

RICHMOND SEWAGE.—Repeal or amendment of certain provisions of the Thames Navigation and Thames Conservancy Acts; extension of time for requiring discontinuance of flow of sewage into the Thames; enlargement of powers of Thames Conservators, Board of Trade, and the vestry of Richmond in relation to sewage; purchase of lands by agreement; agreements as to Crown lands; rating powers; amendment of Acts.

SHEFFIELD CORPORATION WATER.—Transfer of Sheffield Water-Works Company's undertaking to corporation; winding up and dissolution of company; powers to corporation with respect to purchase of undertakings; extension of powers; amendment of Acts.

SHEFFIELD IMPROVEMENT.—For purchase by agreement of the undertakings of the Sheffield Gaslight and Water Companies, levying rates, mortgages, &c.

SHEPPY GAS.—Dissolution and reincorporation of company, with powers for manufacturing gas and supplying the same within the parishes, townships, and places of Sheerness, Minster, and West-Minster, Queenborough, Eastchurch, Warden, Leysdown, Saint Thomas Harty, Elmley, in the Isle of Sheppy, in the county of Kent; and to manufacture and sell or otherwise dispose of residual products; power to enlarge existing works; regulation and increase of capital; and other purposes.

SOUTH LANCASHIRE WATER-WORKS.—Incorporation of company; power to supply water to Halliwell, Heaton, Horwich, Adlington, Blackrod, Westhoughton, Hindley, Ince-in-Makerfield, Aspull, Haigh, Astley, Bedford, Leigh, West Leigh, Pennington, Over Hulton, Middle Hulton, Atherton, and other places in the county of Lancaster; construction of water-works; power to stop up portion of Little Bolton branch of Bolton and Nightingale's turnpike road, and construction of new road in lieu thereof; diversion and appropriation of waters; arrangement with local boards and public bodies; amendment of Acts; and other purposes.

SOUTHPORT IMPROVEMENT.—Repeal, consolidation, and amendment of Acts; extension of borough boundary; purchase of lands and properties, compulsorily or otherwise; power to make sewerage works, new streets, to widen streets, and to extend the promenade at Southport; to erect and maintain gas-works and sidings in connexion therewith; to supply gas in extended limits, and extend the cemetery; providing, improving, maintaining, and regulating town-hall, gaols, police and fire stations, markets, and fairs; to maintain and improve parks, museums, libraries, and slaughter-houses; powers as to sewage, drainage, cleansing, lighting, watching, paving, and improving and regulating the borough and streets thereof; prevention of nuisances; power to lay down gas-mains; new and altered tolls, rates, and duties; powers to borrow money, make bye-laws, and impose penalties; and for other purposes.

STAVELEY WATER-WORKS.—Incorporation of company for supplying Staveley and certain neighbouring parishes and places in the county of Derby with water; construction of works; diversion and appropriation of waters; powers to purchase and maintain existing works; agreements with local boards and other public bodies, and powers to them to raise and apply moneys; and other purposes.

SUTTON AND CHEAM WATER-WORKS.—Reincorporation of Sutton and Cheam Water-Works Company, with powers to maintain and extend existing works, and to supply Sutton, Cheam, and other places in Surrey with water.

THIRSK GAS.—Reincorporation of Thirsk Gas Company, Limited, with powers to maintain works, and light Thirsk and Sowerby in Yorkshire with gas.

TODMORDEN GAS.—Dissolution of Todmorden Gas Company and reincorporation of shareholders; extension of limits, powers to manufacture and supply gas, and as to residual products, &c.; increase and regulation of capital; powers to maintain and enlarge works; to enter into agreements with local boards and others; to receive gas-rents, &c; to repeal and amend Acts; and other purposes.

WANDSWORTH GAS.—Incorporation of company, with powers for manufacturing gas, and supplying the same within the parishes of Wandsworth, Battersea, and Putney, in the county of Surrey; power to purchase lands by agreement; power to purchase undertaking and works belonging to Mr. John Dormay; to levy rates; arrangements as to capital, &c.; incorporation of Acts; and for other purposes, &c.

WANDSWORTH GAS.—To grant powers to Mr. John Dormay, of Wandsworth, to manufacture and supply gas within the parishes of Wandsworth, Battersea, and Putney, in the county of Surrey; to levy rates; incorporation of Acts; and for other purposes.

WARRINGTON GAS.—Increase of capital; extension of limits; recovering rates; provisions as to supply of gas; amendment of Acts.

WATERFORD WATER-WORKS.—Transfer of existing powers and water-works of commissioners to the Corporation of Waterford; powers to corporation to supply water to the borough of Waterford, in the county of the city of Waterford, and places adjoining; power to supply local boards and other authorities with water; new water-works; diversion of water; alteration of mode

of supply of water for domestic or other purposes in Waterford; alteration or repeal of existing rates and rents and agreements for the supply of water; power to levy rates, rents, and assessments for supply of water; to borrow money; amendment or repeal of Acts; and other purposes.

WATFORD GAS AND COKE.—Incorporation of the Watford Gas and Coke Company, with powers to maintain and extend works, and light Watford and Bushey with gas.

WESTHOUGHTON GAS.—Dissolution and reincorporation of the Westhoughton Consumers' Gas Company, Limited; cancellation of Memorandum of Articles of Association; powers to purchase lands, construct works, and to light and supply with gas the township of Westhoughton and townships adjacent; powers to purchase works and plant of the Westhoughton Gas Company, Limited, and the site thereof; dissolution and winding up of that company; arrangements with local authorities; power to dispose of lands and works to the Westhoughton Gas Company, Limited; powers to levy rates; regulation and increase of capital, and other provisions in relation thereto; and other purposes.

WHITBY GAS. — Reincorporation of Whitby Gas Company, Limited, with powers to maintain works and light Whitby and Ruswarp with gas.

APPLICATIONS TO THE BOARD OF TRADE UNDER THE GAS AND WATER FACILITIES ACT.

ALDEBURGH WATER.—Power to construct and maintain water-works, and supply water to the town and parishes of Aldeburgh, otherwise Aldborough and Sudbourne, all in the county of Suffolk.

BECKENHAM SEWAGE.—Application to her Majesty's Principal Secretary of State for the Home Department, under the 7th section of the Sewage Utilization Act, 1865, and the 75th section of the Local Government Act, 1858.

BIDEFORD GAS.—Application for provisional order; maintenance of gas-works, manufacture and supply of gas and residual products; definition of district; further capital; levying rates; variation of Deed of Settlement; incorporation of Acts.

BIRKDALE GAS.—Application for provisional order to enable the Birkdale Gas Company, Limited, to purchase or lease lands and erect and maintain gas-works thereon; to manufacture and store gas and residual products; to lay down mains and pipes and break up streets, &c., to levy rates, rents, and charges for supply of gas; to make contracts, &c.; power to purchase mains and pipes of, and to sell undertaking and works to the Birkdale Local Board; incorporation of Acts; and for other purposes.

BOGNOR GASLIGHT AND COKE.—Application to the Board of Trade for power to maintain and continue gas-works, and to manufacture and supply gas to the town of Bognor and its vicinity.

BOGNOR WATER.—Application for provisional order for authority to construct water-works, and to supply water to Bognor and its vicinity, in the county of Sussex.

BURGESS HILL AND ST. JOHN'S COMMON WATER.—Powers to construct water-works for supply of, and to supply Burgess Hill and St. John's Common, Sussex, with water; and to take rates.

BUSHEY AND WATFORD GAS, COKE, AND COAL.—Power to construct gas-works, and manufacture and supply gas.

FROME WATER.—Application for a provisional order for power to construct water-works; limits of district; power to raise capital; and for other purposes.

GISBOROUGH WATER SUPPLY.—Application for provisional order for powers to construct and maintain water-works, and to supply the township of Gisborough with water, and to acquire lands by agreement for that purpose.

HAWKHURST GAS.—Application for a provisional order for powers to maintain and continue gas-works; limits of district; power to break up streets and levy rates; incorporation of Acts; and other purposes.

HERNE BAY WATER-WORKS.—Application for a provisional order by the Herne Bay Water-Works Company for powers to raise additional capital, and incidental thereto.

HOLYWELL WATER-WORKS.—Construction of works; supply of water to Holywell town and district; power to levy rates; to break up roads and streets; to lay down mains and pipes; to abstract water from St. Winifred's well, and other sources; to purchase water-works, and to sell undertaking; incorporation of public Acts; and for other purposes.

KNUTSFORD GAS AND WATER.—Application under the Gas and Water Works Facilities Act, 1870, to Board of Trade for provisional order authorizing the reincorporation of company with powers for manufacturing and supplying gas, and supplying water within the townships of Nether Knutsford, otherwise Knutsford Inferior, Over Knutsford, otherwise Knutsford Superior, Toft, and Bexton, in the parish of Nether Knutsford, otherwise Knutsford Interior, in the county of Chester, the townships of Tatton, Mere, and Over Tabley, otherwise Tabley Superior, in the parish of Rostherne, in the said county of Chester, and the township of Nether Tabley, otherwise Tabley Inferior, in the parish of Great Budworth, in the said county of Chester; money powers; agreements with public bodies and others; contracts, levying of rates; and other purposes.

LLANRWST WATER.—Construction of works; supply of water to the town of Llanrwst and neighbourhood; and for other purposes.

NORTHAMPTON GASLIGHT COMPANY. — To authorize the raising of additional capital, and for other purposes.

NORTH MIDDLESEX GAS.—Application for provisional order for powers to maintain and renew gas-works, and to manufacture, sell, and supply gas and gas products in the parishes of Hendon and Finchley, or parts thereof; to levy rates; to raise money by borrowing or otherwise; and for other purposes.

PEMBROKE DOCKS AND TOWN GAS.—Application for a provisional order to enable the Pembroke Docks and Town Gas Company, Limited, to acquire land and gas-works; to continue and maintain same; to manufacture and store gas and residual products; to lay down mains and pipes and break up streets; and to supply gas and levy rates and charges therefor; confirmation of existing and powers to make new contracts; incorporation of Acts.

PLYMOUTH AND STONEHOUSE GAS.—Increase of capital.

PORTMADOC WATER.—Application for provisional order to construct, maintain, and continue water-works and works connected therewith, and to supply Portmadoc, Tremadoc, Penrhyn Deudraeth, Borth-y-Gest, and neighbourhood with water; to impound and divert waters, lay down pipes and break up streets; to acquire lands by agreement; enter into contracts, and levy rates and charges; incorporation of Acts; and other purposes.

SOUTHBANK AND NORMANBY GASLIGHT AND COKE.—Application for provisional order for powers to maintain and enlarge gas-works; limits of district; power to manufacture gas, break up streets, raise capital, and levy rates; and other purposes.

SOUTHEND WATER-WORKS.—Application for a provisional order for incorporation of company; power to maintain and continue the water-works and works connected therewith, and supply water.

STAINES AND EGHAM GAS.—Application for provisional order to enable the Staines and Egham District Gas and Coke Company, Limited, to continue their gas-works, and manufacture and store gas and residual products; to lay down mains and pipes, and break up streets, &c.; to levy rates, rents, and charges for supply of gas; to make contracts, &c.; and to increase their capital; incorporation of Gas-Works Clauses Act; and other purposes.

STOURBRIDGE GAS.—Extension of limits of supply to Hagley.

TAUNTON GASLIGHT AND COKE.—Application for provisional order for powers to raise additional capital for the purpose of maintaining and continuing gas-works and works connected therewith; erecting new works; and other purposes.

WELLS WATER-WORKS.—Notice is hereby given, that application is intended to be made in the month of December next, by the above-named company, to the Board of Trade, under the Gas and Water Facilities Act, 1870, for provisional order to construct, maintain, and continue water-works and works connected therewith, and to supply water within the tithings or districts of Milton, Milton and Walcombe, and other places, all situate in and being parts of the out-parish of St. Cuthbert in Wells, &c.

Legal Intelligence.

ROLLS COURT.

THURSDAY, NOV. 24.

(*Before the* MASTER OF THE ROLLS.)

SAWYER *v.* PETERBOROUGH GAS COMPANY.

Mr. JESSEL, Q.C., and Mr. EVERITT were for the plaintiff; and Sir R. BAGGALLAY, Q.C., Mr. PLUMMER, and Mr. BESLEY were for the defendants.

This was a suit brought to recover a sum of money by way of interest, which was alleged had not been reserved in an agreement, as originally stipulated for and intended by the parties. The plaintiff was formerly the owner of the gas-works in Peterborough. In 1867 a company was formed in the town, and negotiations were entered into with the plaintiff for the purchase of his works. On the 3rd of December in that year, Mr. Rutland, solicitor for the company, and several of the directors, met the plaintiff at the office of Mr. Percival, his solicitor, and a discussion took place as to the mode of payment of the purchase-money in case an agreement to purchase was made. It was proposed by the plaintiff that the price should be settled by arbitration, and that the purchase-money should be paid by instalments; and eventually Mr. Percival was requested to prepare a draft agreement, and to send it to Mr. Rutland for perusal. The draft agreement was accordingly sent to Mr. Rutland on the 4th of December. Among the clauses was the following:—"The purchase-money awarded is to be paid as follows—one half part thereof at the expiration of six calendar months from the date hereof, and the remaining half part at the expiration of twelve calendar months from the date hereof, and the last-mentioned half shall bear interest from the expiration of the said six calendar months until payment at 5 per cent. per annum." Mr. Rutland having perused the agreement, made an alteration in red ink with reference to the payment of the purchase-money as follows:—"One half part thereof at the expiration of nine calendar months from the date hereof, and the remaining half part by two equal instalments, the first of such instalments to be paid at the expiration of 17 calendar months from the date hereof, and the last of such instalments at the expiration of two years from the date hereof, and the said two instalments shall bear interest from the expiration of the said nine calendar months, until the respective payments thereof at 5 per cent. per annum." On the 9th of December Mr. Rutland called on Mr. Percival with the altered agreement, and distinctly stated that the directors only desired an extension of time for the payment of the money, observing, "that the plaintiff would not be prejudiced thereby, as he would continue to receive interest at 5 per cent." On the same day Mr. Percival communicated with the plaintiff, and the plaintiff left it to Mr. Percival to finally settle the draft, to carry out the terms, consenting to the extension of time, upon the footing that he would receive interest from the time he gave up possession. Mr. Percival made some alterations in the agreement in blue ink, and whilst doing so it occurred to him that there was no express provision for payment of interest upon the first half of the purchase-money, in the event of its non-payment at the time fixed; he therefore altered the clause in a manner which he considered would provide for that. This alteration was made in blue ink, and the clause then ran thus: "One half part at the expiration of nine calendar months from the date hereof, and the remaining half by two equal instalments, the first of such instalments to be paid at the expiration of 17 calendar months from the date hereof, and the last of such instalments at the expiration of two years from the date hereof, and the respective portions of the purchase-money shall bear interest from the time the same shall respectively accrue due until actual payment thereof respectively at 5 per cent. per annum." On the same day Mr. Percival called on Mr. Rutland with the draft, and informed him that he had made some alterations to secure the payment of interest on the first half in case of default. The agreement was returned by Mr. Rutland with a note to the effect that he saw no objection to the alteration. The whole point in the case turned upon the effect of this alteration made by Mr. Percival. Negotiations went on, and resulted in the purchase of the plaintiff's works by the company at £25,786, the sum awarded by Mr. O'Malley, the umpire. The first moiety was paid on the 10th of September, 1868, being nine months from the date of the agreement, and the defendants were, therefore, let into possession. The second instalment became due on the 10th of May, 1869, and on that day a cheque for £6446 10s. was sent by Mr. Bonnett to Mr. Percival, being the amount of the instalment then due, without any interest thereon. The plaintiff, who had been sent for, stated that he expected to receive interest, and then Mr. Bonnett said that according to the agreement no interest was payable unless default was made. The plaintiff and Mr. Percival at once protested against this, and upon reading over the agreement Mr. Percival had his attention directed to the terms and effect of the alteration he had made in the clause, and then, for the first time, he perceived the ambiguity which had been created by his striking out the words "from the expiration of the said nine calendar months," and substituting the words "from the time the same shall respectively become due." The question for the court was whether, notwithstanding this ambiguity, the plaintiff was not entitled to the interest on his money in conformity with the original terms of the agreement, and with the expressed intention of the parties. Mr. Percival, in his affidavit, averred that the alteration was made in the hurry of business. He had no authority to alter, and did not in any way intend to alter, the terms already agreed upon as to the payment of the interest on the second half of the purchase-money. His only object was to secure payment of interest on the first half in the event of non-payment at the time appointed for payment, and in providing for this he had, in fact, made it doubtful whether interest was payable on either of the instalments, except in the event of default in punctual payment thereof respectively. Application was, however, made to the defendants for payment of the interest on the ground that the words introduced in the clause had given rise to an error. The defendants refused to pay the interest, and announced their determination to stand upon the words of the agreement. In an affidavit by Mr. Taylor, one of the originators of the company, and who formed one of a deputation to Mr. Percival's office to discuss the question of purchase, it was stated that 5 per cent. interest was to be paid on the last instalment, the interest to run from the date of taking possession. No one of the directors then present or Mr. Rutland ever objected, in the hearing of the deponent, to the payment of interest. He never heard, at a subsequent meeting of the directors, instructions given to Mr. Rutland to alter the provision for payment of interest so as to make it only payable from the time when each instalment accrued due.

Mr. JESSEL said nothing could be plainer than how the mistake occurred. It arose from an attempt to provide for interest in case of non-payment of the first instalment. The whole arrangement was obviously this: "Pay your purchase-money and take possession. If you cannot pay all your purchase-money, then pay half at six months and take possession, and you shall have time for payment

of the rest upon payment of interest from the time of taking possession." When the document went back to Mr. Percival, he said, "Oh, suppose they do not pay the first instalment at the end of six months, and do not take possession, they will leave my client with the works on his hands; therefore, I should put in a stipulation that if they do not pay the first instalment, which entitles them to possession at the end of six months, they shall pay interest upon it as if they made default." With this view he altered the clause so as to provide that if they did not pay any instalment at the time fixed they should pay interest, forgetting that he had left in the clause giving possession; and the result was that on the last instalment they would get two years time and pay no interest. It was a mistake. He did not say that Mr. Rutland, who had since died, took advantage of it; probably he did not notice it. He could not say the same with regard to the defendants, because they were now seeking to take advantage of the slip, saying, "Oh, we made no mistake." Personally they made no mistake, because they had nothing to do with drawing up the agreement; they had made their agreement, and they left it to their solicitor to carry it out. The mistake was made by his overlooking the alteration. The mistake, no doubt, was Mr. Rutland's as well as Mr. Percival's. It was not a bargain for new terms. Neither solicitor was deputed to make a new bargain—the bargain had been made; and because a solicitor, in drawing out a complicated agreement, added clauses for the consideration of the other solicitor, merely to carry out the intentions of the parties in other respects, that did not make it a new bargain. This was the real position of the parties in the case. He did not blame the company for seeking to take advantage of the mistake. The opportunity was too tempting for a corporation.

The MASTER of the ROLLS asked, assuming it was a mistake, within what time and under what circumstances could they repair the mistake?

Mr. JESSEL said they lost no time after the mistake was discovered in filing their bill.

The MASTER of the ROLLS said it was not a question of delay; it was that time and circumstances had altered the position of the parties.

Mr. JESSEL said he could not ask the court to rescind the contract, but the question which his lordship had to consider was, whether it was not within the exceptions, where, although you could not rescind, you must treat it as a case of executed contract. The agreement had been made in the first instance which provided for payment of interest on the second half of the purchase-money. The draft agreement was sent to Mr. Rutland, and he made alterations, asking for an extension of time both for taking possession and for payment of the instalments. The agreement, with the alterations in red ink, was submitted to Mr. Percival, who, after consulting his client, assented to the extension of time; but in order to secure payment of the first instalment at the time stipulated, made a further alteration in blue ink, with reference to payment of interest in case of non-payment. Mr. Rutland assented to this alteration, never noticing the effect as regarded the payment of interest on the second and third instalments; his attention was never called to it, and Mr. Percival had entirely overlooked it. Nor was there a scintilla of evidence to show that the directors ever had their attention called to the subject; on the contrary, so far from intending to alter the agreement, the original agreement proceeded upon the basis that the company were not to take possession until they had paid a portion of the purchase-money, and that they were to pay interest on the remainder until it was fully paid.

The MASTER of the ROLLS asked what was the amount of money paid for the works.

Mr. JESSEL said £25,000. The case was clearly one of mutual mistake, which he submitted, upon the authority of cited cases, it was in the power of the court to rectify.

The MASTER of the ROLLS: The court cannot draw a hard and fast line. The court must be satisfied on the evidence that it was a mistake into which both parties fell.

Mr. JESSEL: It was a mistake in this sense, that neither party intended to vary or alter the contract.

The MASTER of the ROLLS: You cannot ask for costs?

Mr. JESSEL: I cannot ask for costs.

Sir R. BAGGALLAY, for the defendants, said the amount in dispute was not large, but an important question of principle was involved. There was nothing peculiar in the form of agreement which the defendants said existed in this case. There were contracts for so much money down, the remainder at a future period, carrying interest. There were also contracts for a certain sum down, the remainder to be paid at a future period, without paying interest. Here the plaintiff alleged that he was not aware of any error in the contract until the second instalment was paid. But there was this strong fact against him. When the company's bill was pending in Parliament, the plaintiff and his legal advisers insisted upon a clause being inserted for securing to the vendor the awarded purchase-money, and the due performance of the contract. A clause to that effect was introduced into the bill, and the agreement itself was inserted in the schedule, and in this state the bill passed the Commons. But in the Lords the clause was struck out by Lord Redesdale, notwithstanding that the plaintiff's adviser urged upon Lord Redesdale to retain it in the bill. Were they to assume that throughout the whole of this period, the plaintiff and his advisers never had their attention drawn to the terms or the words of the agreement? The court could assume nothing of the kind. Again, copies of the agreement were sent by Mr. Percival to the arbitrators, for the purpose of being a guide to them. It might be that Mr. Percival never looked at the agreement on that occasion; but he must take the consequences of his neglect. Were they now to be told, after the arbitrators had made their award, that the agreement contained an error? He ventured to think his lordship had never had a case of such a kind brought before him. The case for the defendants was that all these discussions and correspondence between Mr. Rutland and Mr. Percival were only in the way of negotiations, and that they must look to the written agreement as the final agreement between the parties. The defendants contended that there was no stipulation as to the payment of interest; on the contrary, they instructed Mr. Rutland to strike out that clause in the agreement.

The MASTER of the ROLLS: But he never did strike it out.

Sir R. BAGGALLAY: He never struck it out; but acting upon his instructions he made alterations in red ink with regard to the extension of time, and with regard to other matters. He saw Mr. Percival, and all matters were discussed at great length between them, and finally the agreement was settled in the form in which it appeared. Looking at the original draft agreement, it was perfectly clear that Mr. Percival misunderstood the contract. Mr. Miller and Mr. Searjeant, two of the directors, in their affidavit stated that a meeting took place on the 3rd of December, between a deputation of four members, accompanied by Mr. Rutland, and the plaintiff, at Mr. Percival's office. A general discussion began as to the mode of payment of the purchase-money in case an agreement for purchase was made. It was proposed on the part of the plaintiff, in the previous correspondence, that the amount of the purchase-money should be settled by arbitration. At the interview Mr. Percival stipulated that that mode of ascertaining the purchase-money should be followed. To this they all agreed. Mr. Percival then stated that as the plaintiff's accounts were usually made up in May, he desired that the company should take possession in May. He then asked the deputation how the limited company would pay. Mr. Rutland replied, "Half down and the other half by two instalments." Mr. Percival said those terms would suit exactly. No time was fixed for payment of the last two instalments. Then there was a proposition for payment of interest in case the company made default. It was agreed that the company should pay interest from the time the payment of the instalments accrued due. Mr. Graves, the present solicitor to the company, stated in his affidavit that on the 6th of December, a meeting was held at which the deputation and Mr. Rutland attended, to report the result of the interview. Mr. Rutland read the draft agreement. A discussion took place. The directors were dissatisfied with the draft agreement. One objection was to the time fixed for the payment of the instalments. Another objection was that interest was made payable from the time of possession being taken by the company. The discussion ended in instructions being given to Mr. Rutland to obtain an extension of the time for letting the company into possession, and the payment of the purchase-money, and to alter the provision in the draft agreement with respect to the payment of interest, so as to bring it into accordance with the terms agreed upon at the interview on the 3rd of December, as to the payment of interest. The parties went on to say that Mr. Rutland considered a personal interview with Mr. Percival was the best and quickest method of altering the agreement, and that the alterations in red ink made by him were only provisional, and not final. Mr. Rutland wrote to Mr. Percival for a meeting on the following Monday, the 9th, to discuss the alterations. At that interview Mr. Percival promised to see the plaintiff on the several points discussed. The same day a second interview took place, and, after a long discussion, the terms of agreement were finally agreed upon, and it was arranged that Mr. Percival should settle the draft in accordance with the terms agreed upon. The case on the other side was based upon this—that Mr. Percival either forgot or neglected the interests of his client, and did not do that which he ought to have done; therefore the court was asked to assume that Mr. Rutland had likewise neglected the instructions given to him.

The MASTER of the ROLLS: I think the most reasonable solution of the business is that this matter was discussed, and that Mr. Rutland persuaded the defendants that it was not a thing to be adopted, because I cannot make out, in any view of the case, that Mr. Rutland, if these instructions were given to him, did not neglect his duty. If he altered the draft, why did he not alter it in this material point?

Sir R. BAGGALLAY said it was admitted on both sides that Mr. Percival and Mr. Rutland agreed as to the final form of the draft, and that it was left to Mr. Percival to carry out the draft. He did carry it out, and he sent it to the defendants in a form which exactly confirmed their view of the case. He (Sir R. Baggallay) asked his lordship to hold that there had been no mistake, and that this was not a case which came within the principles which justified the interference of the court. He, therefore, asked that the bill should be dismissed.

Mr. PLUMMER and Mr. BESLEY followed on the same side, addressing themselves more particularly to the question of law.

Judgment deferred.

Miscellaneous News.

FATAL GAS EXPLOSION AT MANCHESTER.

On Thursday last a fatal explosion of gas occurred at the Rochdale Road Station of the Manchester Corporation Gas-Works, by which two men lost their lives and several others were more or less injured. It appears that a new exhauster had been erected during the past week, which had been tested on the previous day, and thought to be perfectly tight and safe. The explosion took place in the exhauster-house shortly before twelve o'clock in the morning, and immediately after the explosion the engine-house was found to be filled with flames, the woodwork in the place and the doors being set on fire, while the flames swept in a most alarming manner up against the side of the adjoining gasholder, scorching and blistering it fearfully. The greatest consternation prevailed in the immediate vicinity of the explosion, and when the workmen had resovered their presence of mind immediate steps were taken to subdue the flames. The Manchester fire brigade arrived on the spot shortly afterwards, and the flames were quickly got under. An alarm was then raised among the workman that an old man, named Mark Clarke, of Gorton Street, Rochdale Road, who had for many years been a servant of the corporation, at the gas-works, was missing. He was said to have been close to the exhauster at the time of the explosion, and when a search was made for him he was found buried under a heap of sand, near to the exhauster, the flesh nearly all burnt off his body, and his head severed from the trunk. His remains were collected together, and removed from the place on a hurdle. Another labourer, named Frank Conway, of Parker Street, Rochdale Road, who had also been for some considerable time employed at the works, was blown by the force of the explosion for some distance, and was found to be so seriously injured that he had to be removed to the Royal Infirmary, where he died on the following day. Mr. Chadwick, the engineer, had a very narrow escape. At the time the explosion took place he was cleaning his engine, which was in the same room as the exhauster, and his hands were very badly burnt. Several of the other workmen who were near were more or less scorched.

On Friday afternoon an inquest was held by Mr. Herford, the city coroner, at the Royal Infirmary, on the bodies of the two unfortunate men, Clarke and Conway.

Mr. *Henry Lyon*, station manager at the Manchester Corporation Gas-Works, Rochdale Road, said from inquiries he had made he believed the accident arose through a defective valve connected with the exhauster. A temporary connexion had been made to admit of the exhauster being used for manufacturing purposes. It was working on a trial by passing air through it, and it appeared to be satisfactory. He thought the valve had been sprung by the workmen screwing up the plates unequally, thus converting the plain surface of the valve into an undulating one. The result would be an imperfect valve, and a leakage at or near the exhauster, where the explosion occurred. He had been told that the deceased Conway, when he smelt an escape of gas, applied a light, which immediately resulted in an explosion, the concussion of which broke the slide of the valve. He had no idea why Conway applied the light, as there was a well-known rule in force that as soon as an escape of gas was perceived all lights were to be turned out. Conway was fully aware of this rule, having been employed at the gas-works for upwards of 30 years.

Timothy John Hennessy said he was engaged as a labourer in the purifying department, and was standing in one of the compartments of the revivifying shed, about 30 yards from the exhauster, when the explosion took place. Upon running out to see what had occurred, he found Conway in a reclining attitude about 20 yards from the seat of the explosion. His clothes were on fire, and he was groaning piteously. Witness assisted to take him to the Royal Infirmary, and on the way Conway told him he had caused the accident by putting a light to one of the pipes to ascertain whence the gas escaped.

James Green, labourer, and *John Mitchell*, mechanic, both gave evidence to the effect that after they made the connexion with the exhauster by screwing the pipes there was no escape of gas. The body of Clarke was found near a heap of sand in the exhauster-house.

The jury returned a verdict of accidental death in each case.

FATAL GAS ACCIDENT AT SOUTHAMPTON.—An accident, supposed to have been caused by an escape of gas, has occurred at Hitchin Ferry, near Southampton. A widow woman, who resided there with her grandson and granddaughter, not appearing as usual yesterday morning, the house was broken into. At the foot of the stairs the granddaughter was found in an insensible condition, and the grandmother and grandson dead in their beds. The granddaughter, on recovering consciousness, said she was awoke early yesterday morning by hearing her grandmother struggling and her brother moaning, and was proceeding downstairs for assistance when she became insensible. An examination of the house has shown that there was a leakage into a cupboard from one of the gas company's mains.

ORIENTAL GAS COMPANY, LIMITED.

The Ordinary General Meeting of Shareholders of this Company was held at the City Terminus Hotel, Cannon Street, London, on Thursday, Nov. 24—W. T. FAWCETT, Esq., in the chair.

The SECRETARY (Mr. A. Hersee) read the notice convening the meeting, and the following report and statements of accounts were presented:—

In presenting to the shareholders the accounts for the twelve months ending the 30th of June last, the directors are happy to report that the progress of the company continues satisfactory, although the general depression of trade has not been without its effect upon the revenue.

The increase in public lighting has been nominal, the funds of the municipality not at present admitting of additional outlay on this account. The residents in those parts of the town where oil is consumed are, however, looking for the introduction of gas, and it is expected that orders will shortly be given to change many of the oil lamps to gas. The illuminating power of the gas supplied by the company has been certified by the authorities to be above the standard fixed.

Private lighting is steadily progressing—120 new consumers were obtained during the year, with an aggregate of 2568 burners. The total numbers of lights on the 30th of June last were—public, 3161; private, 25,011; compared with, respectively, 3159 and 22,443 at the corresponding period of the previous year. There has been an increase in the number of burners fixed in the native bazaars. The directors are of opinion that the value of gas is beginning to be appreciated by the small shopkeepers, and that the consumption in the bazaars will, ere long, be considerable.

About three miles of mains have been added, making a total length of 110 miles laid in Calcutta. The new retort-house and coal-store, referred to in last report, have been completed; they are each 247 feet long and 60 feet wide, and are constructed in the most substantial manner. This provision for increased production will enable the company to meet every demand for a long period. The works generally are in a thoroughly efficient condition.

The directors regret to state that considerable injury has been done to the mains through the sewerage and water operations now being carried out in Calcutta, and a heavy loss of gas has, in consequence, been experienced. Compensation for the damage has been claimed from the authorities, who will doubtless deal with the company in a fair and liberal spirit.

The lighting of Howrah with gas was successfully commenced on the 9th of September last, and the large amount of capital expended there will now become gradually productive. The information received by the board leads them to expect that the consumption at Howrah will fully realise their anticipations.

The labours of the resident committee continue to be appreciated by the directors. The following gentlemen of influence and position now comprise the committee:—Messrs. Henry Dundas (of Shand, Fairlie, and Co.), Robert C. Noble (of M'Killop, Stewart, and Co.), and H. W. I. Wood (secretary to the Bengal Chamber of Commerce). The interests of the company, in their hands, will be secure.

The directors have pleasure in reporting that the engineer and manager, Mr. Blackburn, has exerted himself zealously in the performance of his duties.

The general revenue account shows a balance of £12,787 14s. 7d., out of which the directors recommend a distribution of 6 per cent., free of income-tax, payable on the 3rd day of December next, making (with the interim payment of 4 per cent. on the 3rd of June last) a total dividend of 10 per cent. for the year.

The retiring directors are Walter Thomas Fawcett and James Sydney Stopford, Esqrs., and the retiring auditors are Henry M'Lauchlan Backler and John Robinson Peill, Esqrs., all of whom are eligible for re-election, and offer themselves accordingly.

Balance-Sheet, June 30, 1870.

Dr.				*Cr.*			
To 30,000 shares, of £5 each	£150,000	0	0	By Amount of plant, June 30, 1869	£212,365	2	11
29,990 ditto, ditto (30s. paid)	44,985	0	0	Outlay during the past twelve months	27,972	6	7
10 ditto, ditto (£1 paid)	10	0	0		£240,337	9	6
	£194,995	0	0				
Calls due July 4 paid in June	2,538	0	0	Cost of plant to June 30, 1870	240,337	9	6
Loans on debentures	50,000	0	0	Services laid and meters in use	3,911	14	9
Unclaimed dividends	542	8	3	Amount due to the company	10,121	10	6
Reserve-fund—				Value of stocks, viz.—			
Balance, 1869	5,240	0	0	Coals	3,977	19	0
Appropriated, 1870	1,288	4	0	Purifying material	25	10	0
	6,528	4	0	Products	3,285	17	4
Amount due by the company	21,400	19	2	Fittings and meters	6,120	11	1
Balance from general revenue account	12,787	14	7	Pipes	6,770	19	2
				Horses, conveyances, &c.	491	10	0
				Sundry stores	5,139	12	9
				Office furniture, &c.	376	0	8
					26,186	0	0
				Balance in London	7,533	19	4
				Bills receivable	699	11	11
					8,233	11	3
	£288,792	6	0		£288,792	6	0

Profit and Loss, or Working Account, for the Twelve Months ending June 30, 1870.

Dr.				*Cr.*			
To Manufacture and distribution—				By Gas-rental	£38,251	8	5
Coals used, purification, wages of inspectors, sircars, stokers, lamplighters, mechanics, coolies, &c.	£20,093	4	10	Coke, tar, fittings, &c.	11,379	1	7
Salaries in India and London	2,284	18	6		£49,630	10	0
Directors and auditors	913	0	0	Transfer fees	19	13	6
Passage and general expenses	642	3	11				
Loss on exchange	64	3	0				
Wear and tear and repairs	2,376	8	1				
Reserve-fund	1,288	4	0				
Bad debts and allowances	159	12	10				
	£27,821	15	2				
Balance	21,828	8	4				
	£49,650	3	6		£49,650	3	6

General Revenue Account, June 30, 1870.

Dr.				*Cr.*			
To Dividend of 6 per cent. balance of 10 per cent., for the twelve months ending June 30, 1869, declared at the general meeting, November, 1869	£10,800	0	0	By Balance on June 30, 1869	£12,799	4	9
Interim dividend of 4 per cent., on account of year ending June 30, 1870, paid June 3	7,500	0	0	Ditto on profit and loss account	21,828	8	4
Interest on debentures	2,875	0	9				
Income-tax in India and London	664	17	9				
	£21,839	18	6				
Balance	12,787	14	7				
	£34,627	13	1		£34,627	13	1

The CHAIRMAN: Gentlemen, with your permission I beg now to propose that the directors report and the accounts presented to-day be received and adopted by the meeting, and in doing so I think it is scarcely necessary for me to make many remarks; for, although our report is not particularly long, still we have endeavoured to compress as much matter into it as we thought prudent with regard to the affairs of the company. During the last year we have not fared so well in reference to our revenue as we had hoped. The fact of the case is that great depression of trade has existed in Calcutta for a considerable portion of the year, and, of course, gas being as much an article of luxury as of necessity, the inhabitants at such times economize as much as they can. From this cause it is that our revenue has not been so good as it might otherwise have been. The increase in the public lighting has been, as we tell you in the report, merely nominal, and until the lighting-rate improves it is not likely we shall have a very great extension in that direction. There are about 600 oil lamps in Calcutta at present, and the people in the districts where those oil lamps are situated are very anxious to have the superior light of gas substituted. I have no doubt that as soon as the funds of the municipality will admit we shall have those oil lamps replaced with gas, but that is a question of time. With regard to our private lights we have obtained a very large accession, and though, from the economy I have adverted to, we do not progress so much in revenue from this source as we should like, still the lights are fixed, and when better times come they will be used. The proportionate increase during the past year has been very satisfactory. Our average increase—from the time of the commencement of our operations—has been about 1726 lights per annum. During the past year the increase was 2568. This is a very good omen for the future, and no doubt we shall reap the benefit of this increase in the time to come. Besides, we have a large number of native consumers. Gas has found its way into the bazaars, and though at present the consumption is small, the increase during the past year has been at the rate of 150 per cent. This is an important matter. We had a great deal of prejudice to overcome at first with the small native consumers with reference to the use of meters—they did not understand them—and we have now made arrangements to give them a tariff light, which we are told will lead to a large consumption amongst them. Of our new customers, the native consumers are at the rate of about 70 out of 120, which is satisfactory to the directors, because the natives are there permanently, and we shall not have so many changes as we are obliged to have in the European community where removals are constantly occurring. We have added something to the length of our mains. The total length of mains now in Calcutta is 110 miles. We have also had a considerable expenditure in the new retort-house and coal-stores, which are now completed. We mentioned in the last report that they were in the course of construction; during the past year they have been satisfactorily completed, and, as we now tell you, this provision for increased production will enable the company to meet every demand arising out of extended consumption for a long time to come. We refer you in the next paragraph of the report to the injury done to our mains by the sewerage and water operations which are being carried on in Calcutta. The soil of Calcutta is not favourable to such works, and we have had a large amount of leakage. We have a claim on the authorities for the damage and loss we have sustained, and, as we state, we hope it will be met in a fair and candid spirit. At all events it is in course of negotiation, and it will, we think, be well, unless you desire some further information on the subject, that the question should not be discussed to-day, as it might harass our arrangements with the authorities. The claim amounts to a considerable sum, and it is necessary we should be left free and unfettered to prosecute it in the best way. We feel no doubt that as the authorities have always met us in a friendly spirit before they will do so on the present occasion. The next paragraph in the report refers to the lighting of Howrah. We are not so forward in that matter as we could wish, but we have complied with the terms of the contract, and lighted the streets; also a church with 160 lights. So far as we can see, the introduction of gas having created so great a sensation, and been so favourably received, in all probability it only waits for our ability to give the supply for a large demand to arise. There are several extensive buildings to be lighted as soon as we are ready to undertake the duty, but for the purpose of our contract we have done all that could be required. We have a long contract for Howrah, and there can be no doubt that we made no mistake about the advantage of securing that place for ourselves. Since the lighting commenced we have been inundated with applications to know when we shall be ready to give a supply, and I feel sure that, so soon as we can meet the demand, we shall have a much larger consumption than we originally expected. The time for completing those works was unfortunately delayed; vessels did not arrive in time, and the contractors were behind; but our concession is for 21 years from the commencement of the lighting, and therefore we have something to look forward to. We have hitherto had a large amount of unproductive capital, upon which we have paid the usual rate of interest to the shareholders, but that capital is now becoming productive, and in future years will prove a considerable advantage in our favour. We have again to call the attention of the shareholders to the labours of the Calcutta committee. We have given their names in our report, and we can only say, in addition to what we have there said, that the experience of some years in the matter has abundantly shown that the step we took in appointing that committee was a most prudent step. We hope that the proposal we shall make to you, to pass a vote of thanks to the committee for what they have done, will be carried unanimously, for we deeply feel that they are fully entitled to such a compliment. We have also a satisfactory statement to make to you with regard to our new engineer. Although he has only been a short time in the service of the company, he has answered all our expectations fully. As you see, we propose a distribution of 6 per cent., free of income-tax, making, with the intermediate dividend paid in June last, a total dividend of 10 per cent. for the year. Two of the directors retire as usual. I can only say for my friend, Mr. Stopford

that he is a most useful and energetic director, and, as his knowledge of Indian affairs has been of great service to us, we hope you will re-elect him. For myself, if you think fit to re-elect me, I shall devote my best energies to the interests of the company. I now beg to move—"That the report and accounts be received, and entered on the minutes."

Mr. LEWIS CUBITT seconded the motion.

Mr. ROBARTS remarked that, in looking over the accounts, he could not find that interest was charged on the reserve-fund.

The CHAIRMAN said the interest amounted to £288. The directors had credited the account with interest at the same rate they paid for their borrowed money—the loans on debentures. They had been fortunate in renewing debentures at a lower rate of interest than previously—namely, 5½ per cent. instead of 6; it was now 5 per cent.

A SHAREHOLDER said he observed that though the gas-rental had increased, the receipts for coke, tar, fittings, &c., were not so good as before.

The CHAIRMAN said this was accounted for by a decline in the value of products. The price of tar was formerly higher. With reference to coke, a year or two ago the company had some difficulty in getting rid of it; they had none now.

Dr. BEATTIE said the anticipations he had always formed of the success of the company were now being realized. They had arrived at a condition in which they could pay 10 per cent., and he thought the directors were to be congratulated on such a result of their labours. After the remarks of the chairman, he should be very sorry to make any remark which would embarras the directors in their negotiations with the municipality of Calcutta to obtain compensation for the injury to the company's mains, and the consequent leakage of gas. The soil of Calcutta was as the chairman had described, and excavations for sewerage and water would be certain to affect the pipes. He had no doubt the municipality would meet the directors in an equitable way. Upon the whole, he looked upon the affairs of the company as having arrived at that stage in which they were exceedingly satisfactory.

The motion was put, and carried unanimously.

Dr. BEATTIE: Will there be a call made on the new shares?

The CHAIRMAN: Yes. I was about to mention that the directors have to-day made a call upon the new shares, at the rate of 10s. per share, payable on the 4th of January next. This will put these shares in the position of half shares having £2 10s. each paid on them.

Mr. CUBITT: I have great pleasure in proposing the re-election of Mr. Fawcett and Mr. Stopford as directors. Our worthy chairman has told you what he thinks of Mr. Stopford, and I believe we all fully endorse the opinion he has thus expressed. I might say a great deal about our chairman, but refrain from doing so in his presence. I know you have all had so much experience of his ability and energy that you will have formed a very favourable opinion respecting him, and I am sure you will show it by re-electing him unanimously.

Mr. WHITE: I have much pleasure in seconding the motion. It is, of course, very pleasant for brother directors to speak well of each other, and, bearing that in mind, I can assure you that our friends, Mr. Fawcett and Mr. Stopford, do their duty most thoroughly as directors. They look well after your affairs, and I am sure you cannot do better than re-elect them.

The motion was unanimously adopted.

Mr. STOPFORD: I beg to return thanks to the shareholders on behalf of Mr. Fawcett and myself for this renewed mark of your confidence, and assure you that our best energies will be devoted to the promotion of the interests of the company.

The retiring auditors were also re-elected, and on the motion of the CHAIRMAN it was resolved—"That a dividend of 10 per cent. for the year be paid to the proprietors on the 3rd day of December next, free of income-tax, less 4 per cent. paid on the 3rd day of June last."

The CHAIRMAN: I have now to move—"That the best thanks of the directors and shareholders be given to the resident committee for their attention to the affairs of the company." And I assure you that no resolution proposed here is more entitled to your consideration than this. The gentlemen who compose that committee are thorough working men, and as you see by their names, which are given in the report, they are gentlemen of unexceptional position in Calcutta, so that the interests of the company are perfectly secure in their hands.

The motion having been seconded, was cordially agreed to.

The CHAIRMAN: Reference is made in the report to our engineer and manager. From the experience we have had of him I can only say that he has given entire satisfaction to the directors, and I am sure you will feel that on this occasion we ought to propose a vote of thanks to him. The encouragement which is given by the expression of the satisfaction of shareholders in public meeting to an officer residing 12,000 miles away is very great, and is a testimony which he appreciates even more than the consideration the board of directors always endeavour to show him. I have much pleasure, therefore, in proposing a vote of thanks to Mr. Blackburn, and in assuring you that he is fully entitled to your confidence.

Mr. PATON: I have much pleasure in seconding the motion. Having recently been over the works of the company with Mr. Blackburn, I can testify to their good order and efficiency, and it is very satisfactory to me to be able, on this occasion, to give an outside testimony to the correctness of the report made by the directors respecting them, and which is also so well illustrated by the photographs now laid before the meeting. Mr. Blackburn is carrying out what Mr. Mellor so well suggested and designed, and I must say I never saw gas-works in a better condition.

The CHAIRMAN: This is a most valuable testimony, coming as it does spontaneously from the honourable proprietor, and it confirms in every respect what we have stated to you.

The motion was put, and carried unanimously.

On the motion of Mr. STOKES, thanks were voted to the directors for their continued attention to the interests of the company.

The CHAIRMAN, in acknowledging the vote, said: The assurance that we enjoy the approval and confidence of the shareholders is a great encouragement to us to persevere in the course we have adopted ever since the formation of the company. We, as your directors, have worked together most harmoniously. We never have a misunderstanding, and that, not because one part of the business is taken up by one and another part by another; we are always in attendance, and we all act together for the benefit of the company. There is only one thing I have to add, and that is with reference to my friend on my left—the secretary of the company. I should be sorry that you should part without tendering him your acknowledgments for the services he renders. There are two ways of doing the same thing; one man will do it one way and another, another; but I must say for our secretary, on my own behalf, and on the testimony of a large body of shareholders, that he always meets every one with a desire to do that which he knows it is our wish to have carried out. We are all partners in the concern, and the directors desire that every shareholder should possess the fullest information respecting it, and whenever they seek for that information at the hands of the secretary, it is given in such an agreeable manner as to afford the utmost satisfaction. Conscious of this, the directors will be gratified if you, the proprietors, express your thanks to Mr. Hersee for the important services he renders to the company.

Mr. HADLAND moved that the thanks of the meeting be given to the secretary for the efficient manner in which he has discharged the duties of his office.

The motion having been seconded, was put, and carried unanimously.

The SECRETARY: Gentlemen, I thank you most sincerely for this renewed assurance of your appreciation of my services. I can only say that everything I do for the company is done with a willing heart; and I have always the greatest pleasure in affording all the information to the shareholders which they desire. The chairman has stated that the thanks of such a meeting as this is a great encouragement to an officer at a distance of twelve thousand miles; but I assure you it is equally so to me at home, and furnishes the highest incentive to strive if possible to labour more earnestly than ever to advance your interests.

Votes of thanks having been given to the auditors and to the chairman, the proceedings terminated.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly Ordinary Meeting of Proprietors was held at the City Terminus Hotel, Cannon Street, London, on Tuesday, Nov. 29—P. TWELLS, Esq., in the chair.

The SECRETARY (Mr. A. F. Jackson) having read the notice convening the meeting, the seal of the company was affixed to the register of proprietors, and the following report presented:—

The present half-yearly ordinary meeting of the shareholders has been convened in accordance with the provisions of the Association's new Act of Parliament, 1870, to which the Royal Assent was given on the 20th of June last. It is the first meeting which has been held under that Act, and is called for the purpose of receiving a report from the president and directors upon the affairs of the Association, and for declaring the dividend for the half year ended the 30th of June last. The general character of the workings at the several stations of the Association during that period, and the results of their operations, fully warrant the president and directors in expressing their satisfaction, and also bear testimony to the continued assiduity and judgment which have been exhibited by their principal superintendent, Mr. G. W. Drory, and the engineers and other officers who have co-operated with him in carrying on the business of the Association.

GAS MADE.

The total quantity of gas made at all the stations in the half year ended the 30th of June, 1870, was 1962 million cubic feet. The total quantity made in the corresponding half year of 1869 was 1788 million cubic feet, being an increase of 174 million cubic feet, or at the rate of 9·73 per cent. The increase of the same period of 1869 over that of 1868 was at the rate of 6·68 per cent.

LIGHTS.

The total number of lights at all the stations on the 30th of June, 1870, was 823,968. The total number on the 30th of June, 1869, was 772,006, showing an addition of 51,962, which is at the rate of 6·73 per cent. Both the rental and the profit for the half year now under consideration are larger than for the corresponding half year of 1869.

The Association during the former period has also had the benefit of a diminished cost of coal, and of an enhanced price of the secondary products, coke, tar, and ammonia. It was stated in the last report that new tanks and gasholders would shortly be in course of erection at Antwerp, Berlin, Bordeaux, Cologne, and Frankfort-on-the-Maine. Accordingly, at Antwerp the erection of the new tank and gasholder was forthwith commenced, and will very soon be completed. At Berlin the very large new tank and gasholder will also be completed as soon as possible. At Bordeaux the contract for the erection of a new tank and gasholder has been entered into with the manufacturers, but in consequence of a mistake on their part, which will shortly be rectified, the work has been interrupted. At Cologne the erection of the contemplated new gasholder has been deferred. At the Frankfort station a gasholder has been erected for the new works of Bockenheim, a suburb of that city. These extensive works, together with the purchase of land, extension of mains, and other enlargements of plant, have necessitated large expenditure.

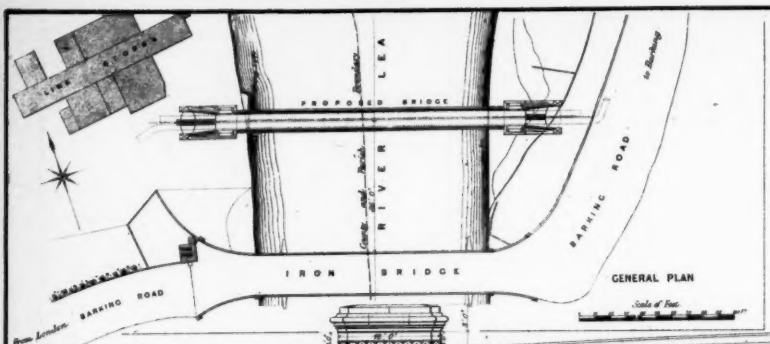
The president and directors would now draw attention to the accounts for the half year ended the 30th of June last. From these accounts, which have been duly audited, the directors have, in accordance with the provisions of the Companies Clauses Consolidation Act, prepared a scheme showing the profits of the Association for the past half year, and the portion thereof applicable to the purposes of dividend, which the president and directors recommend now to be declared—namely, a dividend of £2 per share, payable, free of income-tax, on and after the 15th of December next.

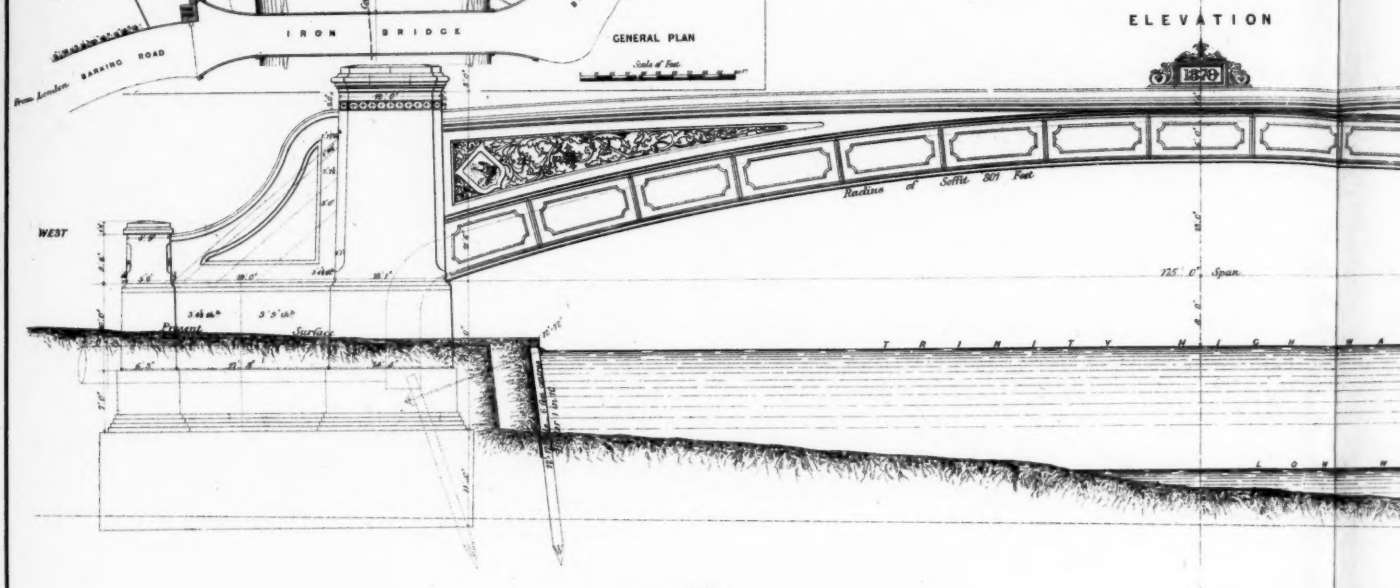
The CHAIRMAN: Gentlemen, in rising to move that the report just read be received and adopted, I would, in the first place, refer to a matter which is always a subject of regret at these meetings—I mean the absence of our revered president, Sir Moses Montefiore. We had a letter from him yesterday, in which he expressed a hope that he should be able to be here to-day; but this morning he sent us a telegram, in which he says: "I assure you it is with the greatest regret I find myself unable to avail myself of the pleasure of attending, with my brother directors, the meeting of the Imperial Continental Gas Association. Pray do me the favour to make my apology to the gentlemen present in my absence, and assure them that nothing but indisposition would prevent my attendance. I ardently hope that long before the next meeting peace will be restored to the world." Gentlemen, I particularly regret the absence of Sir Moses from the present meeting, which is the first under our new Act, for it would have been extremely gratifying to us all if he could have been here to inaugurate our new phase of existence. In his absence, I beg to express to the shareholders my very great gratification that the amount of success attending our working during the last six months has enabled the directors to lay so satisfactory a statement before you to-day. I think I have the pleasure to see the faces of some persons here to-day that I do not recollect to have met before, and for their information I may mention—and I am sure those who are already aware of the fact will forgive me for reminding them—that at our meeting in December, 1860, we declared a dividend amounting altogether to £49,000, and that, after doing so, we had a fund to provide for contingencies and other expenses amounting to £37,300. Since that time the dividends have been constantly increasing by gradual, but I should say rather rapid, strides, till in the present month we propose to divide £112,000 in the shape of dividend, leaving a fund for contingencies and other expenses amounting to £50,400, which certainly shows a very satisfactory state of improvement during the last ten years. Now, at our last meeting—the last two meetings, perhaps, I should say—a certain sum was reserved to meet those contingent expenses, which are necessarily very large, and which increase as our business extends. In the half year covered by the present report we have spent on land about £15,000. We have also, in accordance with the so frequently expressed wish of the proprietors at large, paid off about £10,000 of debentures. We have had sundry new tanks, gasholders, retort-houses, and other new apparatus, which has occasioned an outlay of about £35,000. That accounts for the amount you left in our hands at the last meeting, for the purpose, in the first place, of securing the income we already have, and in the next place of meeting the extensions which became necessary. But I beg you to observe that although this outlay is necessary to preserve the income we already have, it does far more. The outlay last year has produced an increase in the revenue amounting to £13,000; therefore, we not only secure our existing income, but lay out the money in such a manner that it is fairly productive, and brings us a reasonable interest for the disbursement. During the current half year, from the 1st of July to the end of 1870, we shall probably have to spend from £10,000 to £15,000 for land, which we have purchased or agreed to purchase, or which we must obtain. In addition to that, the bonds which become payable amount to £16,000, and therefore the money we now ask you to leave in our hands, as you will at once see, will be absolutely required to meet these contingent expenses—the outlay for providing land and the getting rid of the debentures due. In 1871 we shall have a further amount of bonds to be paid off, which will require the sum of £26,000; and we hope by the time they become due our funds will be fully sufficient for the purpose. Of course it is not easy to say beforehand what will be the result, but under all the circumstances of the case I may state that the directors feel justified in asking the shareholders to consent to the appropriation of the large sum of £112,000 as dividend on this occasion, And, in doing so, I beg to mention to you that this will make up the largest sum ever divided by us as dividend in one year since the association was established. Last year we divided £210,000; this year we divide each half year £112,000, making together the large sum of £224,000. Now, it may perhaps be interesting to the shareholders to know, as far as we can give them information, what may

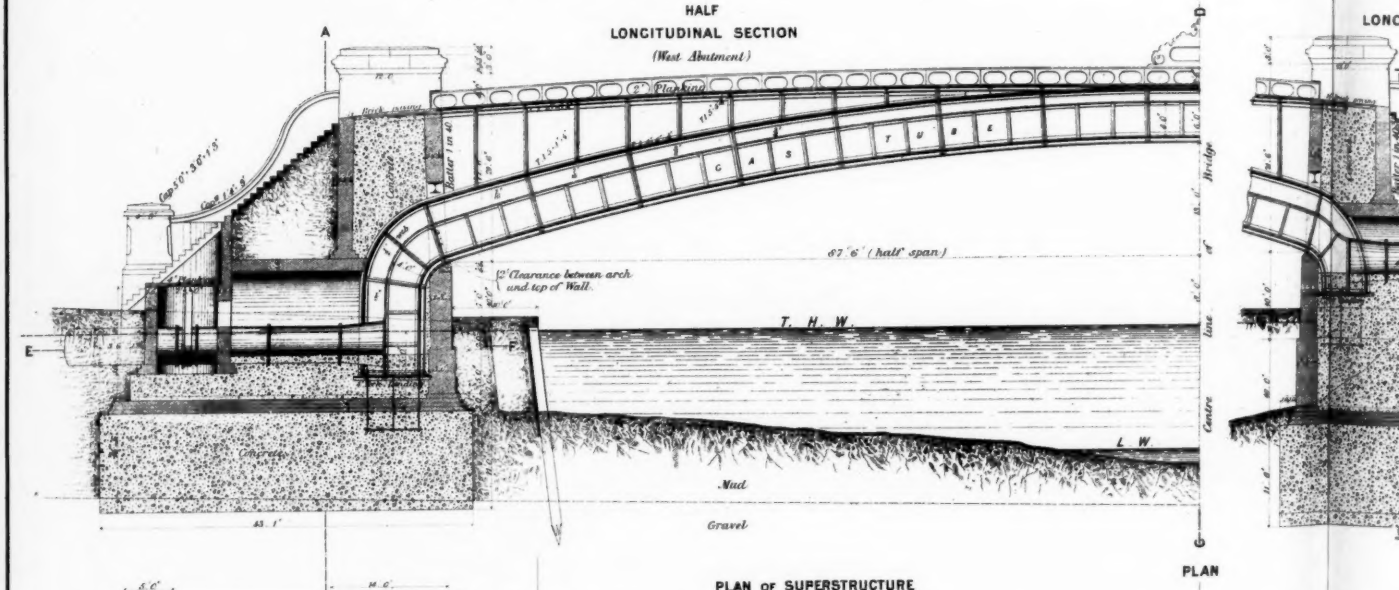
CHARTERED GAS COMP

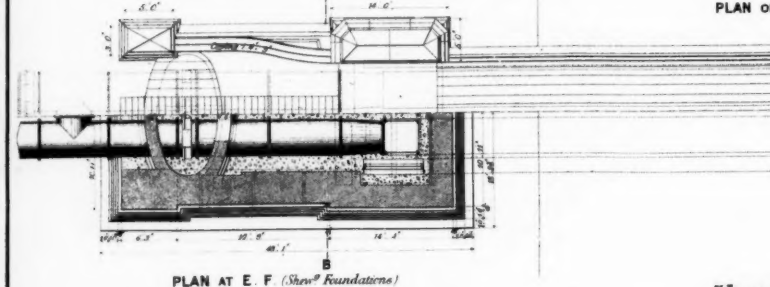
BECKTON WORKS.

BRIDGE OVER RIVER LEA (BOW CREE









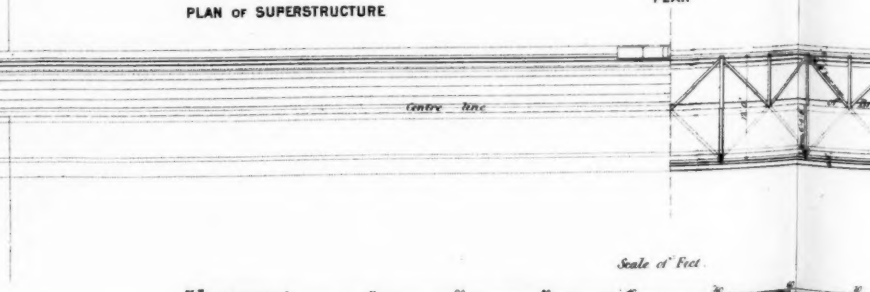


Photo Lithographed by Whiteman & Bass, London

COMPANY.

RKS.

E A (BOW CREEK).

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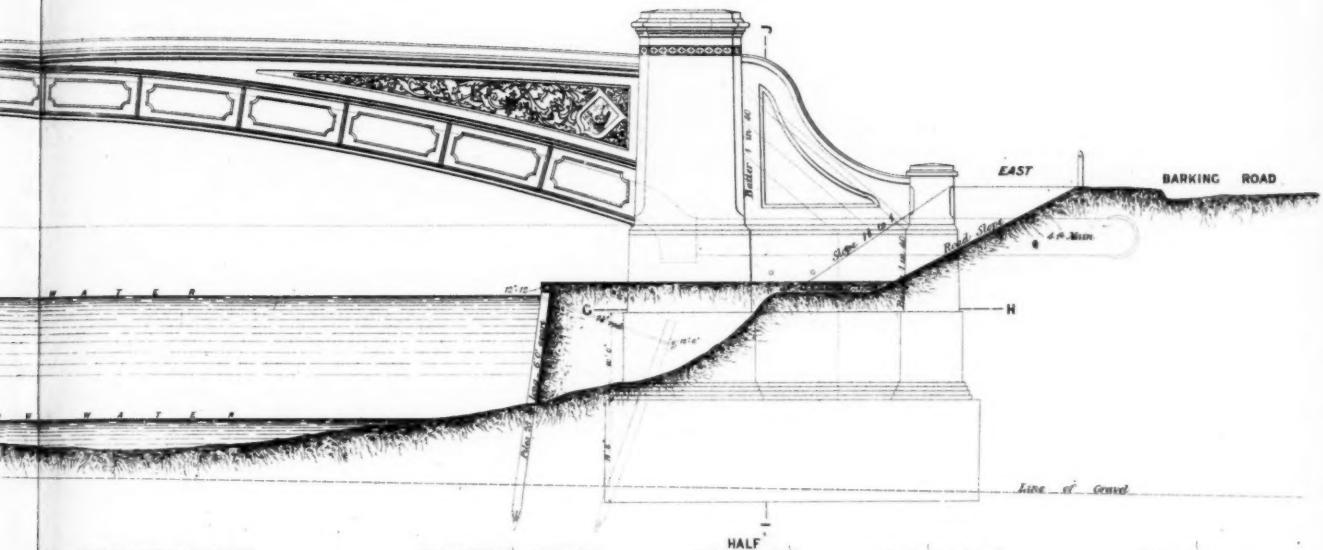
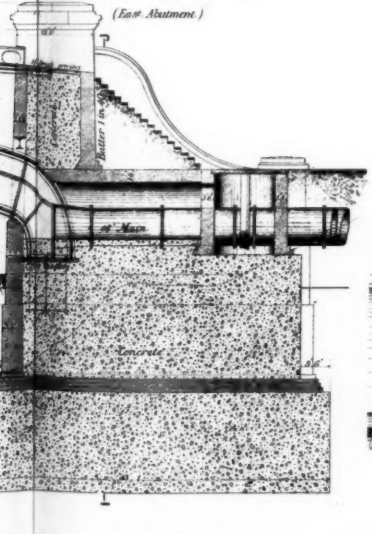
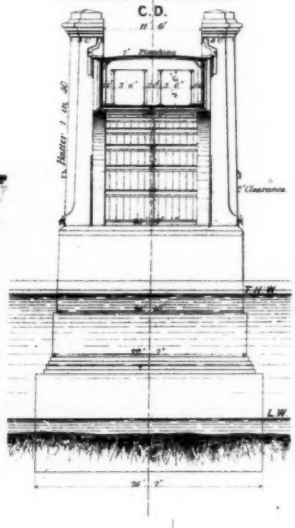


LONGITUDINAL SECTION.
(East Abutment.)



TRANSVERSE SECTION
C.D.



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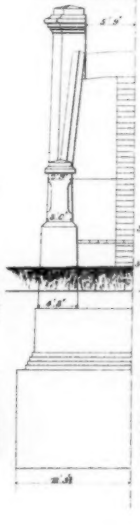
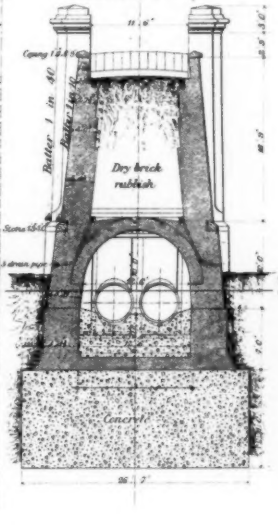
END ELEVATION



SECTION AT A.B.



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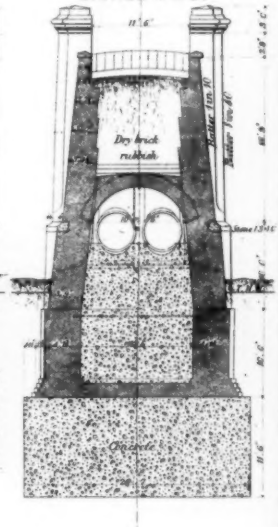
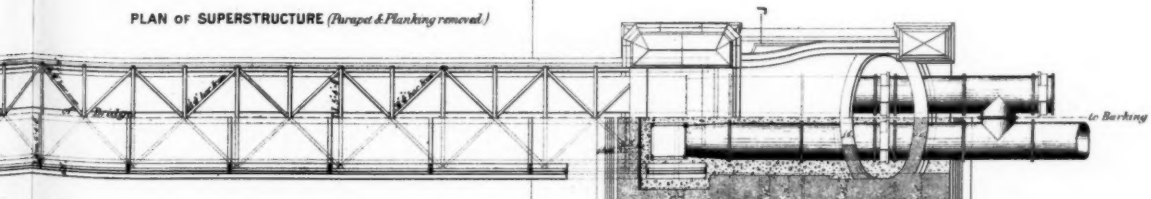


PLAN OF SUPERSTRUCTURE (Parapet & Planking removed.)



PLAN OF CROSS GIRDERS

PLAN AT C. H. (Shewg Foundations)

100 Feet

be our prospects for the future. During the last four months, there has been a very large amount of anxiety felt by the board of directors. In the middle of July, as you all know, war was declared, and the first effect of that was a complete interruption in the usual supply of coals to our stations so far as the conveyance by sea was involved. All the contracts we had entered into with shipowners necessarily came to a termination so far as it concerned any of the Baltic ports or any ports blockaded. The first thing we should think of resorting to in such circumstances would be to get a large supply of coal from the continental mines. But, unfortunately, the same war which caused the blockade of the ports, caused the ordinary means of obtaining those coals to be interrupted also. In the first place, the collieries were much interfered with by the men employed in them being compelled to join the army. In the next place, all the carriages and waggons were taken possession of for the conveyance of troops and military stores. All the ordinary trains were entirely suspended, and it was only occasionally that a coal train could be introduced among the numerous trains required to meet the exigencies of the Government. Under these circumstances a great degree of apprehension was felt at almost all our stations; in fact, some of our engineers seemed almost to fear that they should not have coals enough to carry them through. Our enterprising engineer, Mr. Drory, however, instead of giving way to despair, seemed as though he were roused to greater exertions, and every means he suggested to the directors was immediately adopted to supply our establishments with coal, and all the ships we could hear of that would undertake to convey coals to either of our stations were immediately chartered. Of course we had to incur some risk of the coal not reaching its destination. Fortunately, however, all our coals arrived at their proper destination. We were, I think, exceedingly fortunate, for which, however, we can take no credit to ourselves, although we did all we could to deserve good fortune. Then there was another cause which created a certain amount of apprehension, and that was the diminution in the consumption of gas. It has been stated to you in the report that the increase in the consumption during the past half year, as compared with the corresponding six months of the preceding year, was 9 per cent. In June last the increase, as compared with June, 1869, was 8¼ per cent. In the month of July it was rather reduced, the war having been declared about the middle of that month, and therefore the effect was only partially felt. In July, 1870, the increase, as compared with the same month of 1869, was 7¾ per cent. In August, the effect of the war was more perceptible, the increase being reduced to 2¾ per cent. In September it was still worse, being only 1¾ per cent., which made us feel great apprehension for the month of October, lest the increase should cease altogether. Fortunately, at that time a little reaction took place, and the increase 2·17 per cent. In the present month of November, so far as we have had accounts, we have reason to hope the reduction in the per centage of increase will not be so great as in any of the preceding four months of the current half year. With these prospects before us, we therefore feel justified in recommending the shareholders to consent to the appropriation of £112,000 as dividend on the present occasion; and I now beg to move—"That the report which has been read to you be received and adopted."

Mr. BARBER seconded the resolution.

A SHAREHOLDER: Will you allow me to ask whether any of our works have been injured at all in consequence of the war?

Mr. BARBER: And whether the supply of gas anywhere has been discontinued?

The CHAIRMAN: None of our works have been injured, and the supply of gas has been continued without any interruption at all the stations, and by the great exertions which have been made, the stocks of coal are, at the present date, probably greater than they have ever been since the Association started.

Mr. BARBER: I have no further remarks to make, except to congratulate the directors on their very successful management of the company's affairs during the past half year, and I shall have much pleasure in seconding the motion for the adoption of the report.

Mr. PRIDDEN: I should like to ask whether it is intended to continue the same course as before—viz., to appropriate large sums out of profits for extensions or for new works, instead of dividing the whole as dividends, and making calls upon the proprietors as required. I thought the old system was abandoned when the new capital was raised, and that there was no intention to revert to the old policy.

The CHAIRMAN: The policy which the honourable proprietor seems to recommend is one which has received very serious attention on the part of the directors. In the last Act of Parliament, when the number of our shares was doubled, the main object, of course, was that, with that exception, everything else should remain as it was. But the amount we had to the credit of the fund, which we have so erroneously called our reserve-fund, did not admit of sufficient money being credited to the 56,000 shares as to leave the liability of each shareholder as it stood previously. We gave double the number of shares, with the same amount called up, but that was leaving the amount uncalled upon the two shares double what it was upon the one. It has been an object of great ambition with the directors to write up on the new shares—that is to say, on *all* the shares—such a sum as would leave the liability just the same as it was before the alteration. This matter has recently received their grave consideration, as to whether something should be done at the present time. If it had not been for the breaking out of the war, I may venture to express the hope that something in that direction might have been done on this occasion; but, with the very great uncertainty that hangs over us, we thought it might be scarcely prudent or consistent to suggest any alteration just now. We think it better to wait and see the result of the whole year's transactions before determining what shall be done to meet the views of some of our shareholders.

Mr. FRANK BASSETT: I am sure we must all be gratified at the present position of the affairs of the Association. For the first time for many years the Association stands on a thoroughly intelligent basis. We shall no longer have consumers saying that we are paying 18 per cent. dividends, when in reality they have only been 9 per cent. Such being the case, we are on a much safer footing than we have ever been before. As regards that large item which used to excite our cupidity in a very remarkable manner, I am sure our excellent chairman and the directors must have had some difficulty in dealing with Lord Redesdale on the point. Lord Redesdale could hardly believe that any body of shareholders would allow from a million to a million and a quarter to be taken out of their profits, and kept away from them for so many years. It only shows what a long-suffering body of proprietors we have been. But now the thing is put on a sound basis, we must take care not to go to the other extreme. Of course there are certain expenses at every station, which are necessary for keeping the whole of our property in repair, and if the directors will take what they require to lay out on new works or for fresh land from the capital, I have no doubt we should be quite willing that they should keep the works in a proper state of repair in the way they have done, and that we shall not bind them down too tightly in this respect. Now, it is most important in a large concern like this to have a real *bonâ fide* reserve-fund, and when we get rid of our bonds, which we seem to be doing at a rapid rate (it has always been a sore point with me that we should have bonds at 5 per cent. while we had large sums of money invested in Consols)—I say, when we get rid of these bonds I should like to see the Association have a reserve-fund of £250,000 invested in Consols. Having made these remarks, I will only add that I think we are deeply indebted to the chairman and directors for the very admirable manner in which they have managed this concern. I am quite sure that during the last few months they must have had a great deal of anxiety, and I hope we thoroughly appreciate what they have done. I should like to move that a sum of £2000 be placed at their disposal, to mark our sense of their extra exertions.

The motion for the adoption of the report was then put, and carried unanimously.

On the motion of the CHAIRMAN, it was also resolved—"That a dividend of £2 per share be declared upon the 56,000 shares of the Association, for the half year ended on the 30th of June last, and that the said dividend be payable, free of income-tax, on and after the 15th of December next."

The CHAIRMAN: There is one observation which fell from the honourable gentleman who last addressed the meeting to which I ought to refer. I would offer to him on my own behalf, and I am sure I may say on behalf of the gentlemen who surround me, our thanks for the kind appreciation he has shown of our services, and of the confidence he has expressed in our management. At the same time, while duly grateful for the compliment paid to us, I must add, that with regard to the suggestion implied in his remarks—to make us some pecuniary recompense—I am sure I express the feeling of all my brother directors that we shall be better satisfied to decline the latter suggestion.

Mr. BARBER: At all events, gentlemen, we ought not to separate without passing a cordial vote of thanks to the directors for their services, and especially to the chairman, for the very lucid and candid manner in which on this and former occasions he has placed before us his statement of the affairs of the Association.

The motion having been duly seconded, was put and carried unanimously.

The CHAIRMAN: Gentlemen, I beg to thank you very sincerely for your kindness. I very much regret that on this occasion we not only have to deplore the absence of our president, but also of Mr. Drory, who is at Ghent. He does not remain there from ill health, but so many things press on his attention at the present time, that in the interest of the Association we thought it expedient to dispense with his attendance to-day.

On the motion of Mr. BARBER, seconded by Mr. BASSETT, it was cordially resolved—"That the thanks of the proprietors be given to Mr. Drory, the general superintendent of the affairs of the Association on the Continent, for the ability with which he attends to the business of the stations."

The proceedings then terminated.

FARMER'S THEOREM DISCUSSED.

BY F. E. STIMPSON.

[From the *American Journal of Science and Arts*, Nov., 1870.]

Towards the close of Professor Silliman's paper, "On the Relation between the Intensity of Light produced from the Combustion of Illuminating Gas and the Volume of Gas Consumed," is the following:—"A comparison of the foregoing results will show that the coincidences with the requirements of the theorem of Farmer are, within the limits assigned, too numerous, and too closely accordant, to be considered as otherwise than pointing clearly to its general truth."

What I propose to examine now is, whether the data given in the paper referred to do warrant the conclusion reached.

According to the data given for the first experiment, two lights were made equal, so that the disc of a Bunsen photometer stood midway between the flames, and the consumptions were found to be 3·66 feet per hour.

"The screen was then moved upon the bar to a point just four times as far from one flame as it was from the other—*i. e.*, the bar being 100 inches, the screen stood at 80—*i. e.*, as 1 : 4. The light from the distant burner was then increased, until the disc again showed as an equality of illumination. On reading the rate of the gas consumed by the two burners respectively, one gave 3·66 cubic feet and the other 7·32 cubic feet."

Now from this it will be seen that the ratio of consumption was as 1 to 2, but the ratio of the lights being as the squares of the distances from the disc, becomes $200^2 : 80^2$ or 1 : 16, and the result on the paper should stand,

$$3{\cdot}66^4 : 7{\cdot}32^4 = 1 : 16, \text{ and not}$$
$$3{\cdot}66^2 : 7{\cdot}32^2 = 1 : 4.$$

In other words, the lights were proportional to the fourth powers of the consumptions, and not to the squares.*

In experiments 2, 3, and 4, the ratio of the squares of consumption is nearer to the ratio of the lights than the simple ratio of the consumptions, but in experiment 2 the ratio of the 2·67 powers of the consumption almost exactly expresses the ratio of the lights. In experiment 3 the ratio of the squares is too small, and in experiment 4 it is too great; while in experiment 5 the simple ratio is certainly much nearer than the ratio of the squares.

The following table will, I think, suffice to show these various relations:—

Number of Experiment.	Rate of Consumption per Hour.	Intensity found by Experimt.	Intensity by Old Law.	Intensity by Law of the Squares.	Intensity by the 2·67 Power of Consumption.	Difference between Calculated and Observed Results.		
						Old Law.	Law of Squares.	2·67 Power.
2	3·30	1·	1·	1·	1·	0·	0·	0·
	4·35	2·1	1·32	1·73	2·008	−0·78	−0·37	−0·002
	5·136	3·2	1·55	2·42	3·222	−1·65	−0·78	+0·022
	5·556	4·0	1·68	2·83	3·995	−2·32	−1·17	−0·005
3	3·72	1·	1·	1·	..	0·	0·	—
	4·884	2·	1·312	1·72	..	−0·628	−0·28	—
	6·000	3·	1·61	2·60	..	−1·39	−0·40	—
	7·218	4·	1·94	3·76	..	−2·06	−0·24	—
4	4·5	1·	1·	1·	..	0·	0·	—
	9·519	4·	2·114	4·46	..	−1·886	+0·46	—
5	5·16	1·85	1·85	1·85	..	0·	0·	—
	10·06	4·00	3·70	5·72	..	−0·30	+1·72	—

In experiment 6, the reductions have been made by applying the old rule to the correction for the candle in both cases; the correction by Farmer's theorem being applied only to the consumption of the gas, and, so applied, gives the most concordant results. The difference shown by the old rule, however (1·34 candles), is no greater than might have occurred between two observations, even if the consumption in both cases had been equal—*i. e.*, 5 feet per hour. But this experiment alone certainly does not warrant the conclusion reached, viz.:—"That this theorem applies with equal force to the weight of sperm consumed by the standard candle as to the volume of the gas burned in equal times," because the correction has *not* been applied to the candle either here or in any other observation given in Professor Silliman's paper.

The confirmation obtained by experimenting upon Peytona, Albert, and Wollongong gas depends upon the assumption that the true candle power of a rich gas can be obtained by mixing it in definite proportions with another gas whose illuminating power is known, and deducing from the observed candle power of the mixture, the candle power of the rich gas. Until this assumption has been proved to be correct, it is of course useless in establishing Farmer's theorem.

The next proof offered is drawn from a tabular statement in Sugg's "Gas Manipulation." Professor Silliman says, "By this statement the burner in question produced from 5 cubic feet of gas exactly 15 (14?) candle

* Since the above was written, I have been informed that the error is not in the proportion of ("1 to 4"), but in the statement of the position of the disc upon the bar. It should read *twice* as far from one flame as the other—*i. e.*, the screen stood at 66⅔, and thus the experiment supports the theorem.

power, but when reduced to 4·5 cubic feet consumption, the candle, when 'corrected' to the standard quality of gas by proportion, was only 11·93 candles. The values of the 'correction' referred to can only be conjectured; but assuming that the observation made the uncorrected rendering 11·32 candles (a very probable quantity), we find that the law of the squares of consumption then makes the ratio as follows:—$4{\cdot}5^2 : 11{\cdot}32 = 5^2 : 14$." The assumption here made is not at all necessary, because we can find the exact value of the "correction" for the gas by reversing the proportion used, thus:—$5 : 11{\cdot}93 = 4{\cdot}5 : 10{\cdot}73$, and now applying Farmer's theorem the ratio becomes $4{\cdot}5^2 : 10{\cdot}73 = 5^2 : 13{\cdot}24$ only. The relation can be exactly expressed by the ratio $4{\cdot}5^{\frac{4}{3}} : 10{\cdot}73 = 5^{\frac{4}{3}} : 13{\cdot}997 = 14$.

The last proof offered is drawn from Audouin and Bérard's experiments. But after several fruitless efforts to obtain the results, as given under the head of "Intensities by law of the squares of consumption," I am forced to conclude that these figures are incorrect through some inaccuracy in applying that law. The two tables referred to may be found in the author's original memoir on pages 439 and 441 of "Annales de Physique et de Chimie," vol. lxv., 1862. In these experiments they compared the burning of two bat's-wing burners, at different rates of consumption, with a "Bengel Argand" whose rate of consumption was nearly constant. The first three columns of the table below give their experimental data.

TABLE I.—*Burner of the Fifth Series—Slit $\frac{1}{20}$ Inch Wide.*

Consumption of the Bat's-wing under trial. Litres per Hour.	Consumption of the Bengel Argand. Litres per Hour.	Comparative Intensities, the Bengel Burner being 100.	Intensities by Old Formula or Direct Ratio of Consumptn. l'	Difference between Calculated and Observed Results.	Intensities for Law of the Squares of Consumption. l''	Difference between Calculated and Observed Results.
211	100	120	99·38	−0·62	82·31	− 17·69
189	96	110	97·64	−2·36	86·38	− 13·62
180	103	100	100·00	0·00	100·00	0·00
156	104	90	104·85	+4·85	122·17	+ 22·17
142	104	80	102·39	+2·39	131·06	+ 31·06
124	101	70	99·65	−0·35	141·84	+ 41·84
102	101	60	103·82	+3·82	179·68	+ 79·68
88	102	50	99·30	−0·70	197–19	+ 97·19
68	100	40	102·79	+2·79	264·20	+164·20
57	102	30	90·73	−9·27	293·40	+193·40

TABLE II.—*Burner of the same Series—Slit $\frac{1}{30}$ Inch Wide.*

264	106	200	100·4	+ 0·4	50·3	− 49·7
236	105	180	100·1	+ 0·1	55·6	− 44·4
208	105	160	100·9	+ 0·9	63·5	− 36·5
182	105	140	100·9	+ 0·9	72·8	− 27·2
152	104	120	102·6	+ 2·6	87·7	− 12·3
130	104	100	100·0	0·0	100·0	0·0
112	104	80	92·8	− 7·2	107·8	+ 7·8
90	104	60	86·6	−13·4	125·1	+ 25·1
75	104	50	86·6	−13·4	150·2	+ 50·2
66	104	40	78·8	−22·2	155·2	+ 55·2
48	104	20	60·5	−39·5	182·8	+ 82·8
28	104	10	46·4	−53·6	215·5	+115·5

From the first table it will be seen that the two burners gave equal light (intensity 100), when the bat's-wing consumed 180 litres per hour, and the standard 103 litres. Correcting the first line of this table for these consumptions, by the old rule we have—

For the bat's-wing . . . . . 211 : 180 = 120 : l.
For the standard . . . . . 103 : 100 = l : l'.
The total correction for both will be therefore $211 \times 103 : 180 \times 100 = 120 \times l : l \times l'$.
The l cancels out and leaves the proportion. $211 \times 103 : 180 \times 100 = 120 : l'$.
The second line of this table becomes . . $189 \times 103 : 180 \times 96 = 110 : l$;
and so on

Now applying Farmer's theorem, the proportions become—

$$(211)^2 \times (103)^2 : (180)^2 \times (100)^2 = 120 : l',$$
$$(189)^2 \times (103)^2 : (180)^2 \times (96)^2 = 110 : l'.$$

The value of l' and l'' from these proportions will be found in the fourth and sixth columns of the above table.

It will be seen that in the second table the burners gave equal light for consumptions of 130 and 104. These numbers have been used, therefore, in the corrections for that table.

The experiments show that the last term of the proportions should be 100. The tables show that, by the old formula, this term becomes about 100 for every experiment of the first table, and for the first seven experiments of the second table, the greatest difference being 7·2; and for the remaining five experiments, the old formula gives the best approximate results, except for the last one, and here the old law gives a result which must be *multiplied* by 2·15 to make it correct, and Farmer's theorem gives a result that must be *divided* by 2·15 to make it correct.

From a perusal of these various results, I am led to disagree with Professor Silliman, and say that Farmer's theorem is not proven, and that the law of the squares does *not in general* give any closer results than the old law of the direct ratio; though I entirely and heartily concur with him in the conclusion, *that every photometric observer should recognize the importance of bringing the consumption of gas and sperm to the agreed standard*, when attempting to give the true candle power of any gas.

It is much to be desired that experimenters should turn their attention to the matter of the relation of consumption of gas to illuminating power, and I sincerely hope that Mr. Farmer will not let the matter rest here, but will make and publish further observations upon the same subject.

Messrs. Audouin and Bérard, in their valuable experiments to determine the best burner for the city of Paris, proved that for every consumption of gas there is a burner which is best suited for that consumption. Now, by the proper selection of a burner for small consumptions, some simple relation may yet be found between consumption and illuminating power.

In the above, reference has been made only to experiments detailed in Professor Silliman's communication. I have, however, made a number of experiments myself upon the same subject, besides collating the results of some sixty or more independent observations, which have been published during the last fifteen years, and the results are curious, instructive, and unexpected. There are a few among them to which Farmer's theorem might be applied, quite a number to which the old law will apply, though many of them require a *modification* of the old law.

I hope in due time to prepare a paper giving some of these results.

EXPLOSION OF GAS AT IPSWICH.—On Wednesday night a man named Johnson, occupying a house near the Ipswich Gas-Works, examining, with a lighted candle in his hand, a small hole at the foot of the chimney-piece of one of his rooms to see whence an escape of gas proceeded, caused an explosion of so violent a character that he was hurled by its force back against the opposite wall, while several of eight children in bed at the time were blown from their beds, and the front and part of the side of the house were forced out. No one was, however, injured.

ON THE DETERMINATION OF THE PHOTOMETRIC POWER OF A RICH GAS BY DILUTION WITH A POOR GAS OF KNOWN VALUE—THE "METHOD OF MIXTURES."

By B. SILLIMAN.

[From the *American Journal of Science and Arts*, Nov., 1870.]

In a paper on "Farmer's Theorem,"* I have given several examples of the method of determining the intensity or photometric power of a rich gas by diluting it with several times its own volume of a poorer gas of known intensity, and then calculating its value from the increment of intensity. Having demonstrated in the paper before mentioned the worthlessness of all determinations of the intensity of gases of high illuminating power made by burning them in volumes less than 5 cubic feet, and then calculating their intensity by the rule of three up to that volume, I have shown how much more exact results were obtained when the results were calculated upon the theorem of Mr. Farmer; this greater exactness being predicated largely upon the confirmation drawn from parallel observations upon the same gases when measured by the method of mixtures. The results thus obtained having, however, been questioned by Mr. Stimpson, on the ground that the method itself had not been experimentally demonstrated, I have undertaken lately, in connexion with Mr. Farmer, to make some experiments calculated to test its accuracy.

The results which go to support the accuracy of the method were obtained with the use of a new photometric apparatus, constructed for the Manhattan Gas Company, under my direction, by Sugg, of London, and which was designed to embrace all the best approved features which recent experience has indicated in photometry. A discussion of these details would be out of place in this connexion. Before detailing our results, it will be proper to present the method of determination of intensity for gas of high illuminating power, as practised by Mr. Farmer at the Manhattan Gas-Works, in New York, and which I have called *the method of mixtures*.

To find the candle power of a gas having, for example, an intensity greater than 20 candles, mix the rich gas of unknown power with a poorer gas of known power in such proportions that the intensity of the mixture shall not be greater than 20-candle power, when consumed at the agreed rate of not over 5 cubic feet per hour. Then to compute the candle power (intensity) of the rich gas—

Let a = the per centage or volume of gas of low intensity.
" b = the intensity in candles of the gas in low intensity.
" c = the per centage or volume of rich gas used in the mixture.
" d = the intensity in candles of the mixture as observed.
" x = the intensity in candles of the rich gas required.

Hence, $\frac{ab + cx}{a + c} = d$ $\qquad \frac{(d-b)a}{c} + d = x.$

$$ab + cx = ad + cd$$
$$cx = ad + cd + ab.$$

And this expression is stated arithmetically in the following

RULE.—*Subtract the intensity of the poor gas from the intensity of the mixture; multiply the remainder by the volume of poor gas; divide the product by the volume of rich gas; add to the quotient the intensity of the mixed gas, and the sum is the intensity of the rich gas sought.*

Now, when we reflect that in any given illuminating gas we have always a certain volume of non-luminous combustible gas as the substratum to which is added, according to its source and mode of treatment, a variable volume of illuminants, it is no unwarranted assumption to say that the illuminants (chiefly olefines) are *diluted* by the non-illuminants. It is agreed, on all hands, that hydrogen, marsh gas, and carbonic oxide, which together form the mass of the non-luminous substratum of all illuminating gas, have of themselves, when pure, no luminosity, and when burned at ordinary atmospheric pressures and corresponding temperatures, that they may, in fact, be called, as to luminosity, neutral. It can hardly be questioned that the intensity which these neutral gases may assume in a given mixture must depend, under the same ordinary conditions before mentioned, upon the amount and kind of olefines they may take up in the destructive distillation of the coal or other hydrocarbons used in making gas. If these assumptions are true, we ought to be able to demonstrate them by experiment, by commingling certain volumes of a gas of known intensity with a neutral gas of no intensity. These experimental conditions would be met by using carbonic oxide as the neutral gas, or better still, the mixture of carbonic oxide and hydrogen resulting from the decomposition of vapour of water at a high temperature in contact with highly ignited carbon, as in the hydrocarbon gas process. But in default of any convenient means of obtaining these gases, we had recourse to hydrogen gas evolved by the action of diluted sulphuric acid upon zinc in a large self-regulating generator of hydrogen. It is well known that hydrogen thus made is not absolutely non-luminous, but it is sufficiently so for photometric purposes. The avidity of hydrogen for all the olefines, however, renders it difficult to obtain entirely satisfactory results with the use of this gas, provided it is passed through gas-pipes and holders which have been previously used for the transmission of coal gas, since, however carefully one may rinse out these tubes by hydrogen, there may yet cling, probably, some small trace of the condensed illuminants to the walls of the tubes, which imparts a trifling intensity to the hydrogen passing through them.

To obtain a supply of rich gas of uniform intensity, 100 lbs. of Albertite were coked until 810 cubic feet of gas had been taken from it of a density of ·498. This gas was purified, collected, and preserved in a separate gasholder. Its intensity was determined—

1. By Farmer's theorem . . . . . = 30·49 candles.
2. By mixing with poor gas . . . . . = 30·95 "
3. By simple ratio . . . . . = 26·20 "

In determining the intensity of this gas by the method of mixtures, 20 per cent. by volume of Albert gas was mingled with 80 per cent. of 10·6-candle gas obtained from a poor coal. The mixture had an intensity of 14·67 candles. Hence—

$$(14{\cdot}67 - 10{\cdot}60) \times 80 \div 20 + 14{\cdot}67 = 30{\cdot}95 \text{ candles.}$$

for the intensity of the Albert gas by the method of mixtures.

1ST EXPERIMENT.

Taken 75 volumes of coal gas . . . = 14·75 candles, observed.
" 25 " hydrogen . . . = —
" 100 " mixture . . . = 10·22 " "
If hydrogen=0, this mixture should have given= 11·06 " calculated.
Hence there is an error of observation of . . = ·84 of a candle, which makes the value of the hydrogen apparently below zero.

2ND EXPERIMENT.

Taken 75 volumes of coal gas . . . = 14·25 candles, observed.
" 25 " hydrogen . . . = —
" 100 " mixture . . . = 10·35 " "
If hydrogen=0, this mixture should have given= 10·69 " calculated.
Hence there is an error of observation . . = ·25 " which again makes the value of the hydrogen apparently a little below zero.

The want of sufficient storeage room for hydrogen and the necessity of many repetitions, and much care in manipulation to avoid errors of quantity in the synthesis of mixtures make experiments of this sort tedious, and my other avocations have prevented my multiplying them as much as is desirable. I think, however, that most photometric observers will agree with me that it is safe to conclude, from these two experiments, that the action of hydrogen in

* JOURNAL OF GAS LIGHTING, vol. xix., p. 59.

gaseous mixtures is simply that of a diluant. We might make a thousand observations by the means now at command, and not obtain one with an exact 0 for hydrogen. A very trifling error in the admeasurement greatly influences the result.

We may, therefore, safely conclude, as it appears to me—

1. That in all illuminating gas we have a certain substratum of non-luminous gas, holding in solution a variable volume of luminous gas (olefines).

2. That when a gas is too rich in illuminants to permit of accurate photometric admeasurement by the usual standards of intensity, it may be diluted with a poor gas of known value and volume to such a standard as is consistent with the accurate employment of the usual photometric apparatus, its true value being then calculated from the known values employed.

P.S.—I find in the manuscript records of the Manhattan Gas Company mention of four experiments made many years since by Mr. Schultz, chemist of that company, in which he mixed 5 per cent. and 10 per cent. of hydrogen with gas of very high illuminating power. The results are less satisfactory than they would have been had the volume of hydrogen employed been much larger and the intensity of the coal gas not over 15 candles. Moreover, at that time the means of admeasurement at the command of the observer in the laboratory of the Manhattan Company, of small volumes of gas were much less exact than they now are. The results obtained are as follows:—

1st Experiment.

Taken 90 volumes of coal gas	. .	= 22·53	candles,	observed.
„ 10 „ hydrogen	. =	—		
„ 100 „ mixture	. .	= 19·11	„	„
If the hydrogen is taken as 0	„ . .	= 20·27	„	calculated.
Showing apparent error of	. . . .	.= 1·11	„	„

2nd Experiment.

Taken 95 volumes of coal gas	. .	= 22·53	candles,	observed.
„ 5 „ hydrogen	. =	—		
„ 100 „ mixture	. .	= 20·35	„	„
If the hydrogen is taken as 0	„ . .	= 21·39	„	calculated.
Apparent error	. . . . .	.= 1·04	„	„

3rd Experiment.

Taken 90 volumes of coal gas	. .	= 20·83	candles,	observed.
„ 10 „ hydrogen	. =	—		
„ 100 „ mixture	. .	= 19·44	„	„
If the hydrogen is taken as 0	„ . .	= 18·29	„	calculated.
Apparent error	. . . . .	.= + ·15	„	„

4th Experiment.

Taken 95 volumes of coal gas	. .	= 20·83	candles,	observed.
„ 5 „ hydrogen	. =	—		
„ 100 „ mixture	. .	= 20·52	„	„
If the hydrogen is taken as 0	„ . .	= 19·79	„	calculated.
Apparent error	. . . . .	.= + ·73	„	„

New Haven, Sept., 1870.

THE WATER SUPPLY OF PAISLEY.

By Mr. Alexander Leslie, A.I.C.E.

[Abstract of a paper read before the Institution of Civil Engineers.]

In the year 1835 parliamentary power was obtained to bring in water, for the supply of Paisley, from the districts of Gleniffer and Harelaw, lying to the south of the town, having respectively drainage areas of 624 acres and of 166 acres. The works were executed under the direction of the late Mr. R. Thom, Mem. Inst. C.E., who made careful experiments, extending over a period of three years, to ascertain the amount of water flowing from the Gleniffer district, by means of which the quantity actually available was found to be 70,354,769 cubic feet per annum, which was equivalent to 31·06 inches out of a depth of 46·13 inches of rain, over an area of 27,189,063 superficial feet. Of this quantity Mr. Thom awarded one-fourth as compensation to bleach-fields.

The works consisted of a reservoir at Harelaw, capable of holding 14,248,000 cubic feet of water, with a conduit leading from thence to Stanely, where there were two reservoirs, one to act as a subsiding pond, the other for holding clear water, with regulating sluices for turning the water into either. The open conduit between Harelaw and Stanely was the principal feeder for the Stanely reservoirs; in its course it intercepted the burns flowing from Gleniffer braes, which was almost all pasture ground. The store reservoir was capable of holding 28,340,000 cubic feet, and the clear-water basin, 7,194,000 cubic feet. These works provided a supply of 22½ gallons per head for a population of 50,000. In 1855 the works were transferred from the company to the Town Council, and the claims were settled by arbitration at 6¾ per cent. on capital.

In 1853 new powers were obtained to bring in the water of the Rowbank burn, with a drainage area of 1220 acres. These powers were, however, allowed to lapse, and another nearly similar Act was obtained in 1866, under which the present works had been constructed.

Gauges were erected on four streams, and two rain-gauges were placed at different levels, to test the amount of water flowing off the drainage area in proportion to the rainfall. The quantity of rain falling on 700 acres, the depth being 64·39 inches, was equal to 163,614,990 cubic feet, and on 350 acres, the depth of rain being 50·79 inches, 64,528,695 cubic feet. The average depth of rain over the whole area was 59·86 inches, or 228,143,685 cubic feet, and subtracting the amount measured by the weirs, 179,662,325 cubic feet, there remained for loss by evaporation, &c., 48,481,360 cubic feet, which was equal to 12·72 inches of the rainfall, leaving 51·67 inches available for the high ground, and 38·70 inches for the low ground. There now remained 170 acres with a rainfall of 38·07 inches to be added, which yielded 23,492,997 cubic feet of water per annum, raising the total to 203,155,322 cubic feet per annum.

The pipes were constructed to carry 184 cubic feet per minute, and the compensation water was fixed by the Act of 1866 at 92 cubic feet per minute. Storeage was provided for 180 days, or for about 77,000,000 cubic feet. A conduit, 6¼ miles long, conducted the water to the Stanely filters, whence it was conveyed to Paisley by a 16-inch pipe. A branch-pipe left the main three miles west of Paisley to supply the towns of Johnstone and Elderslie, and a set of filters and a tank were constructed at Craigenfeoch for filtering the water supplied to those places. Another set of filters and a tank were placed on the high ground to the south of the original reservoirs of Stanely, with a branch-pipe leading down to them, to make up any deficiency that might occur in the old works.

The store reservoir erected to impound 77,000,000 cubic feet of water required three embankments, of which the largest was 60 feet deep and 500 feet in length along the top, with slopes of 3 to 1 on the inside, and of 2½ to 1 on the outside The puddle wall was 8 feet broad at the top, and increased with a batter of 1 in. 8 on each side down to the surface of the ground, from which point it diminished to one-half that width, the greatest depth being 62 feet. The other two embankments were respectively 230 feet long and 14 feet deep, and 815 feet long and 18 feet deep. The first operation consisted in the formation of a by-wash channel, to carry the water of the Reivock burn during the construction of the large bank, as it was from this burn that floods were apprehended, and it now served for conveying impure water on their occurrence. When this was finished the outlet tunnel was proceeded with, the purpose of which was, in the first place, to discharge the water which would have accumulated during the construction of the bank, and to receive the two outlet-pipes, one of which carried the compensation water and the other the water for the town. The tunnel was 426 feet long, and the interior dimensions were 5 feet 6 inches by 5 feet 6 inches. It had vertical side walls and a semicircular roof. The whole length of the arch was 15 inches thick, of moulded bricks set in cement, with an arch of rubble stone set in mortar over it. At the lower end of the tunnel there was a sluice-house 10 feet square, with an arched roof, while at the inner end of the tunnel there was a horse-shoe shaped recess of masonry, in which was placed an iron upstand, or sluice shaft. This recess was 10 feet 9 inches long by 5 feet 9 inches broad, with walls 2 feet 6 inches thick. The upper end of the tunnel, for a length of 17 feet, was filled with solid masonry round the outlet-pipes, and provision was made in the contract for filling the tunnel with clay round the outside of the pipes; but this had not been necessary. The waste weir was excavated in the solid rock at the south end of the large bank, and was 40 feet long, being at the rate of 1 foot in length for every 30 acres of drainage area.

It was originally intended to strip the entire surface of the inside of the reservoir, as vegetable matter was formerly considered objectionable, but the cost of this led the commissioners to dispense with it.

The sluice upstand, in the horse-shoe recess, was of cast iron, 2 feet 6 inches in diameter in the inside, and 35 feet high, the metal being three-quarters of an inch in thickness. It had four sluices at different levels, each being 17 inches square, and fitted with double brass faces. The compensation water was discharged through a separate pipe, with an independent sluice, and the water for the town was conveyed into a cast-iron well, which was constructed with an overflow to take the pressure off the clay pipes, which led from it towards Paisley. The total length of the pipe track from the reservoir to Stanely was 11,126 yards, of which part was of iron pipes, part of clay pipes, and part of masonry aqueducts, the pipes varying in diameter from 16 to 21 inches. The trench was excavated 1 foot wider at the bottom than the exterior diameter of the pipe, and opposite each faucet there was a clear space of 6 inches all round, to permit of the proper jointing of the pipes. The clay pipes were jointed with rope yarn and cement; while the iron pipes, which were for the most part turned and bored, were put together with thin cement. Where clay pipes were used in cuttings above 9 feet deep, a relieving arch of rough rubble was formed over them, which served thoroughly to protect them from crushing. Where the depth of the cutting exceeded 12 feet, a masonry aqueduct was substituted for the clay pipes, the sectional area of which was 3 feet by 2 feet.

The filters constructed at Craigenfeoch for Johnstone and Elderslie were two in number, each 45 feet by 32 feet, and the tank was 50 feet by 26 feet and 13 feet deep. The retaining walls were brought up with a void of 4 inches in the heart, with two dovetailed recesses to form a tie opposite each other, 12 inches by 6 inches by 6 inches deep, for every square yard of surface. These voids were filled with clean gravel in layers of 6 inches, and each layer was grouted with Portland cement. This formed an excellent water-tight wall, the only objection being the cost, which amounted to between 40s. and 50s. a cubic yard. There were two semicircular wells at the outlet of the filters, with sluices to regulate the head of water over the filters during filtration. The filters had each a 12-inch clay pipe along the centre, with 4-inch branch pipes open jointed. The filtering material consisted of 2 feet of coarse gravel, 6 inches of small gravel, 6 inches of slate chippings or shells, 6 inches of coarse sand, and lastly 18 inches of fine sand. The high-level filters and tank erected at Stanely were of the following dimensions:—Three filter-beds, each 90 feet by 60 feet, and by 38 feet a tank 138 feet and 14 feet deep, constructed on the same principle as the others.

The engineer for the works was Mr. James Leslie, Mem. Inst. C.E. The contractors for the reservoir at Nethertrees were Messrs. Alexander Wilson and Son, and the cost of it, inclusive of sluices and iron work, was £17,433. The same contractors executed the filters, for Johnstone and Elderslie, and also the branch pipe from the main aqueduct, at a cost of £7554. Mr. John Pollock was the contractor for the pipe track from Rowbank to Stanely, which cost £15,414, and for the Stanely filters which were not yet completed. Messrs. D. Y. Stewart and Co. cast all the iron pipes, and also laid that portion between Stanely and Paisley. The total cost of the scheme, including purchase of land, way leave, parliamentary and engineering expenses, amounted to £70,000.

METROPOLITAN BOARD OF WORKS.

At the Weekly Meeting of the Board, held at the Offices, Spring Gardens, on Friday last, Dec. 2—Colonel Hogg, M.P., in the chair,

The Clerk (Mr. Pollard) read a letter from Mr. S. Barber, secretary of the Western Gas Company, stating that in consequence of the notice given by the board of an intention to introduce a bill in the next session of Parliament to promote the amalgamation and regulation of the metropolitan gas companies, a meeting of the directors of the several companies had been held. Eight out of the eleven companies were represented on that occasion, and a resolution was adopted to the effect that, having observed with satisfaction the less hostile tone of the discussion which had recently taken place on the subject, the directors were prepared to consider with the board the principal points upon which it was proposed to seek legislation, and would appoint a deputation for that purpose if the board would select a few of their members to meet them.

On the motion of Mr. Collinson, the letter was referred to the Parliamentary Committee to confer with the companies, and report the result to the board.

The Clerk read the following report from the Parliamentary Committee as to the proposed bill for regulating the gas supply of the metropolis:—

The board, on the 11th inst., instructed the solicitor to issue a notice of their intention to apply to Parliament for leave to introduce a bill for promoting amalgamation amongst the existing gas companies of the metropolis, and for establishing uniformity of price, and other matters, based upon the provisions of the City of London Gas Act, 1868. A notice was accordingly prepared and advertised in the newspapers, and your committee gave instructions for the heads of a bill to be drawn up and submitted to the board for approval. In the meantime the solicitor, having received a communication from the Board of Trade, saw the assistant-secretary, who stated that the Board of Trade had resolved to introduce a bill on the subject themselves, and that this board need not therefore be at the trouble or expense of preparing a bill. The solicitor, however, had prepared the heads of a bill in accordance with your committee's instructions, and as the assistant-secretary expressed a desire to be furnished with a copy of those heads, your committee directed that a copy should be sent for his information.

It will be remembered that the deputation from the board which had an interview with Mr. Shaw Lefevre in the early part of this month, urged upon him the desirability of the Government taking up the question, as there would then be a greater probability of its being successfully dealt with.

Your committee doubt not that the board will receive with satisfaction the intimation that the Board of Trade have decided to propose to Parliament to legislate upon this subject. The course which it will be for the board now to adopt is to carefully consider the provisions, and to watch the progress of the measure to be introduced, with a view to secure to the ratepayers and consumers of gas the greatest advantages consistent with a due regard for existing rights and interests.

Your committee accordingly recommend that it be referred to them to watch the progress of the bill, and if necessary to confer with the Board of Trade thereon.

(Signed) Wm. Newton,
Silas Taylor,
W. H. Dalton,
Jno. Runtz.

Mr. NEWTON, in moving the adoption of the report, said there had been an entire change in the intention of the Government. The Board of Trade at first expressed a strong desire that the Metropolitan Board should promote the bill, and accordingly the necessary parliamentary notices were issued to enable them to do so, and the Parliamentary Committee afterwards instructed the solicitor to prepare the heads of a bill. But, as explained in the report, the solicitor had had an interview with the assistant-secretary of the Board of Trade, who informed him that it was the intention of the Government to promote bills with reference both to the supply of gas and water. Under those circumstances it would be the duty of the Metropolitan Board to watch the two bills, so as to see that the interests of the consumers of the metropolis were properly secured. No doubt the bill as prepared by their solicitor would have been satisfactory in these respects, but its introduction was now unnecessary.

The motion having been seconded,

Mr. BRUSHFIELD asked whether the expenses already incurred by this board would have to be borne by them, or whether they would be chargeable to the Board of Trade.

Mr. NEWTON said the Metropolitan Board would defray their own expenses.

Mr. BRUSHFIELD thought the board were being placed in an undignified position. It seemed to him that they were a nose of wax, with which the Government could do as they liked. He was surprised that the board should submit to be played fast and loose with. It was on the bidding of the Government that the expense of the parliamentary notices had been incurred, and now the board were told they need not trouble themselves in the matter as the Government had taken the settlement of the question into their own hands.

Mr. DRESSER ROGERS regretted that the board would not be taking up the question, because it appeared to him that the notice issued by the Government was too wide in its scope, and would be less likely to succeed. That notice proposed to deal not only with the London companies, but with those in the suburbs —such as the Crystal Palace District, the Woolwich, Brentford, and other companies—thus raising up an unnecessary antagonism to what might be a fair and equitable bill in itself. He believed that if such a bill as that which this board had given notice of had been prosecuted, the companies themselves would have agreed to it; but the Government having gone so wide in the sweep of their notice, he was fearful they would not carry their bill through the House. It would certainly be incumbent on the board to see that the clauses introduced into the Government bill did not nullify any of the advantages which the metropolis enjoyed under the present law. There were several points which would require attention, and he thought it would be advisable to refer the bill when received to the Works and General Purposes Committee, by whom the gas question had been well considered, to go through the clauses and examine them carefully. This need not interfere with the Parliamentary Committee, whose action he did not wish to impede, but as the Works Committee had so fully discussed the matter, they might be able to advise the Parliamentary Committee on many important points.

Mr. HOWS said he thought it was fighting with a shadow to propose any particular line of procedure before the bill was in the hands of the board. It seemed to him that the ratepayers of the metropolis could not feel very satisfied to see legislation on such important questions as the supply of gas and water shifted about, first from the Government to the board, and then back again to the Government.

Mr. NEWTON said with reference to the action of the Government he did not think any complaint ought to be made, nor did he think any other terms than those of courtesy should be applied to them. They had not deceived the board on this question at all. At the first interview they stated that in their opinion it was the duty of the board to initiate legislation on the subject. The deputation represented to them that the bill would have greater influence if it proceeded from the Government, and promised, if the matter were taken up by them, the Metropolitan Board would support them. As the Government now saw their way to take action, he did not see that there could be any objection to their taking it. As to the reason why the board issued notices when the Government had determined to proceed, he might state that it arose in this way. When the solicitor was in communication with the Board of Trade, the question was asked whether it would be necessary, and he was strongly advised that the Metropolitan Board should give their notice notwithstanding the publication of the Government notice. Possibly it was thought that when they came to consider the question the Board of Trade might be unable to carry it on through their department. It appeared, however, that if there had been any such difficulty it was now overcome, and that there was no further necessity for this board to proceed in the matter. The expenses incurred had not been very great, and no doubt there would be a clause inserted in the Government bill which would provide for the payment of those expenses.

The motion was then put and carried.

Mr. BIDGOOD moved the following resolution:—"That the board do endeavour to insert in any bill promoted by the Government or the board on the supply of gas, a provision for securing for metropolitan improvements such surplus profits of gas companies as may remain after payment of dividends."

Mr. RUNTZ said he should like to understand the meaning of the resolution. Did not the gas companies absorb the whole of their profits in the payment of dividends?

Mr. BIDGOOD said they did not; the dividends were limited to 10 per cent. In commending his proposal to the acceptance of the board, he dwelt on the importance of many metropolitan improvements, the carrying out of which was rendered impossible for want of the necessary funds, and the desirability of the board possessing the means to raise money for the purpose otherwise than by direct taxation of the ratepayers. The consumption of gas, he remarked, was very large in the metropolis, and if the board could only secure 1d. per 1000 cubic feet on the present quantity consumed, it would bring them in an income of from £40,000 to £50,000 a year. And it must be borne in mind that the consumption of gas was constantly increasing, so that the income thus derived would be yearly enlarged. It might be asked, why should the board attempt to derive funds for metropolitan improvements from such a source? To that inquiry he would reply that it was a perfectly fair and reasonable thing to do. When it was considered that the freehold which the board, as representing the ratepayers, possessed was to a very large extent—in fact, to its entire extent—made use of by the gas companies for the purpose of carrying on their trade, and that they resorted to it when they pleased, where they pleased, and how they pleased, he thought it might be regarded that this gave the board a fair claim to some return. The companies, in carrying on their business, were largely indebted for their success to the use they made of the public freehold for the laying of their pipes, and it was but right that they should make some corresponding compensation to the public in return. It would probably be said that such a proposition would injuriously affect the dividends of the companies. He did not think it would. A careful study of the proceedings at the meetings of the gas companies would show that the directors were sometimes puzzled to know how to expend their money, so as to appropriate all their profits. It appeared to him that this money would be much better spent in public improvements than in adding to the remuneration of directors, or in devising how to get rid of their surplus, so as to enable them to call up fresh capital, which, he believed, was the case to a large extent with gas companies. If the board had a controlling power over the gas companies, so as to see that all their expenditure was legitimate, this would not be so. He believed that after every one connected with the companies was well paid there might be a surplus from their profits turned over to the board, which would enable them to carry out many minor and even some large metropolitan improvements. Referring to the advantages of indirect taxation for such purposes, he instanced the Thames Embankment, a work which he thought would probably never have been accomplished if the board had not possessed such a source of income. He considered it was a fair proposition to obtain funds from the profits of gas supply in the way he suggested, and he hoped the board, in any attempted legislation with the companies, would endeavour to insert provisions for the purpose.

Mr. LEGG said he should second the proposition, because he thought it would be a good move on the part of the board to raise a revenue without being burdensome to the ratepayers. But inasmuch as the board ought to endeavour to obtain a cheap supply of gas to the metropolis, he considered the motion scarcely went far enough, and would suggest the addition of the words, "when the price of gas to the consumers is reduced to 3s. 6d. per 1000 cubic feet."

Mr. HOWS doubted whether the gas consumers of London would be willing to assent to the motion. If there were only two parties to be consulted—the gas companies and the board—it might be very well to talk of such an arrangement, but there were the consumers to be considered, and they had a right to expect that the price of gas would be reduced in proportion to the profits of the companies. If the board had the supply of gas in their own hands they might fairly discuss what should be done with the surplus profits, but seeing the supply was in the hands of companies, all they had a right to do was to see that proper reductions were made in the price of gas whenever those surplus pofits justified them.

Mr. RICHARDSON thought Mr. Bidgood was financially wrong in his proposition. It must be borne in mind that the Legislature hitherto had provided for the appropriation of the surplus profits of the companies. It was distinctly enacted that all surplus profits should be given to the consumers, and it was folly to ask the board to introduce clauses into a bill containing a directly contrary principle. Mr. Bidgood also seemed to forget that the coal used by the gas companies was already taxed for metropolitan improvements. Having, therefore, taxed the material out of which gas was made, it would be a fiscal arrangement opposed to every recognized principle to tax the gas when made for the same object. And then looking at the case on its merits—adopting the hypothesis that such clauses as his friend proposed could be introduced into future legislation—he would ask whether Mr. Brushfield's or any other company would ever show a surplus to be so appropriated?

Mr. SAVAGE said he thought it was very doubtful.

Mr. RICHARDSON said he was well aware that the companies accounts were directed to be prepared in a certain way, and that auditors were appointed to test their correctness; still, he had no faith that there would ever be a surplus shown after the payment of dividends to the shareholders. But putting this all aside, and admitting the value and importance of indirect taxation for metropolitan improvements, he was convinced that the Legislature would never adopt a regulation of the kind, and it would be lowering the character of the board to attempt to engraft such a provision on the bill.

Mr. DRESSER ROGERS said he was sorry he could not support Mr. Bidgood in his proposal. He thought the first duty of the board was to endeavour to improve the quality of the gas supplied, and then to obtain a reduction of price to the consumers. If his friend would help forward a movement which was really in the true interests of the gas companies, for the acquisition of the gas supply by the board, he would much better effect the object he had in view. There was practical proof to be had of this fact. While in the greater part of London 12-candle gas was being supplied at 4s. per 1000, in the city of Manchester, where the works were in the hands of the corporation, 22-candle gas was being supplied at 3s. 2d.; and during the last year the gross profits from the supply amounted to £65,000. The effect of Mr. Bidgood's motion would be to keep up the price, and prevent any improvement in the quality of the gas supplied by the companies.

Mr. DALTON said the working of the present system was, that if there were any surplus profits the companies must reduce the price of gas, but if this motion were carried there never could be any reduction, and the companies would be guaranteed their present dividends for ever and ever.

Mr. BRUSHFIELD thought that Mr. Bidgood could never have studied the existing Acts of Parliament, or he would not have put forward the statement that the companies absorbed the whole of their profits in the way he stated. The companies were not in a position, nor had they any desire to evade the terms of their Acts, and he believed they had always done everything in their power to effect proper reductions in the price of gas. If Mr. Bidgood's proposal were carried out it would not be the gas companies who would be taxed for metropolitan improvements, because they would still be secured their statutory dividends, but the consumers of gas, upon whom it would be a gross injustice, because they never could have a reduction in price.

Mr. NEWTON said Mr. Bidgood's notion was, no doubt, very enticing, but it was not at all clear how it could be put in practice. In the first place, it was fiscally wrong according to the policy always adopted in this country. It might be said that in Paris a tax was levied on the gas, but no fair comparison could be instituted between Paris and London. In Paris the municipality obtained 5d. per 1000 cubic feet for civic purposes, but then everything else was subject to an *octroi* in that city, and therefore a tax upon gas was perfectly consistent. In London it would be impossible to obtain legislative sanction for the creation of an exceptional tax upon an article of very general consumption like gas, and any attempt to do it would cause a vast amount of discontent. Imbued as the Legislature was with Free Trade principles, there was no chance of such a proposition gaining acceptance, especially when it was remembered that the raw material from which gas was made was already taxed for metropolitan improvements. He knew it had been frequently said that at Manchester a large revenue was derived from the manufacture of gas for city improvements, but there gas could be made and sold at a comparatively small cost, so that it was not so much complained of that a profit should be derived from that source. But however the companies in London might strive, they could never make gas so cheap as at Manchester, nor of the same high illuminating power. Not only at Manchester were they free from the coal-tax of 1s. 1d. per ton, but they possessed other advantages with respect to coal and labour, which the London companies not possessing, were prevented from supplying gas on the same terms. When he was in Manchester some years ago, there was considerable dissatisfaction among the large consumers at the extra price charged for gas for the sake of town improvements, and which it was stated caused them to pay more than they would have had to pay as their share towards these improvements if a direct rate had been made for the purpose. Then in London there was a strong desire to obtain gas at a reduced price; the consumers had been promised it for years, and they ought to have it, as well as of a higher illuminating power. Until that promise had been fulfilled, the consumers would never consent that the revenue derived from the supply of gas should be appropriated in any such way as was now proposed. For his own part he had no hope that the board would be able to raise any funds for improvement purposes except by direct taxation, unless they should be successful in obtaining a renewal of the coal dues in 1888, and even for that they would have a severe struggle.

Mr. SHAW thought Mr. Bidgood must have been studying how to act on the good old Scotch adage, "Raise money; honestly if you can, but raise money." Could anything be mose palpably unfair than to attempt to plunder the gas consumers in this way? Such a taxation for metropolitan improvements would press most unequally. The small tradesmen would contribute at an enormous rate, while many large mercantile firms would pay next to nothing. It was idle to talk about what was done in Manchester. There was no analogy between Manchester and London. In the former the works were in the hands of the municipality, the funds for establishing them subscribed on the security of the town, and therefore the profits were carried to the account of the town.

He for one had no objection if the board could get hold of the gas companies, for they possessed a gross monopoly; but this was not the way to do it, and if the board laid such a proposition before Parliament they would be thoroughly laughed at.

Mr. NICOLAY said the motion, if carried, would be perfectly harmless, for no one knew what the profits of gas companies were, nor how they were appropriated; and if they were subject to such a provision they would expend capital on the most frivolous pretence, for the sake of getting rid of the surplus. It was generally felt that the consumers, while paying a very high price, got a very bad article; and, though inspectors were employed to test the gas at very high salaries, the public got little or no benefit from it. But as far as the proposition now before the board was concerned, he did not know why they should be asked to stop with the gas companies. Why not take the surplus profits of the water and all other public companies, until at last the ratepayers would be entirely relieved from taxation.

Mr. BIDGOOD now expressed a wish to withdraw his motion, but

Mr. LEGG, the seconder, objected.

The CHAIRMAN put the question, when one hand only (Mr. Legg's) was held up in its favour, and it was accordingly lost.

KETTERING GAS COMPANY.—The annual meeting of the shareholders of the Kettering Gas and Coke Company was held on the 22nd ult.—J. Stockburn, Esq., in the chair. The report was laid before the meeting, and the year's account ending June 30 was read, which showed a profit of £426 6s. 11d., being £125 3s. 4d. in excess of the preceding year. A dividend of 6 per cent., free of income-tax, was declared, and £84 6s. 11d. was added to the reserve-fund. The town having considerably increased its boundaries, it is thought it will be necessary to enlarge the works, for which purpose the committee will be called together to consider how the money shall be raised.

AVERAGE COMPOSITION AND QUALITY OF THE METROPOLITAN WATERS, IN NOVEMBER, 1870.—The following are the returns of the Metropolitan Association of Medical Officers of Health:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Comps.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	19·23	0·050	0·091	0·005	14·9	3·4
West Middlesex	18·57	0·039	0·110	0·002	14·6	3·6
Southwark and Vauxhall	19·60	0·053	0·091	0·004	14·9	3·5
Chelsea	19·27	0·050	0·110	0·004	14·9	3·5
Lambeth	19·10	0·064	0·091	0·005	14·2	3·5
Other Companies.						
Kent	26·60	0·004	0·175	0·000	20·0	5·6
New River	19·03	0·018	0·110	0·000	14·6	3·3
East London	18·20	0·014	0·110	0·004	14·8	3·4

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and, in the case of the metropolitan waters, the quantity of organic matter is about eight times the amount of oxygen required by it. The water was found to be clear and nearly colourless in all cases.

The average quantity of water supplied daily to the metropolis during the preceding month was, according to the returns of the water companies to the Association of Medical Officers of Health, 104,073,197 gallons; and the number of houses supplied was 482,565. This is at the rate of 32·4 gallons per head of the population daily. The last official return from Paris stated that the average daily supply per head of the population was 29·3 gallons; but this includes the water used for the public fountains, and for the ornamental waters in the Bois de Vincennes and the Bois de Boulogne.

H. LETHEBY, M.B.

DR. STEVENSON'S REPORT ON THE GAS SUPPLIED BY THE IMPERIAL COMPANY TO THE VESTRY OF ST. PANCRAS DURING THE MONTH OF NOVEMBER, 1870.

Date.	Number of Observations.	Average Light in Candles produced by 5 Ft. of Gas per Hour.	Light in Candles reduced to Consumption of 120 Grs. per Hour.	Traces of Ammonia.	Traces of Sulphuretted Hydrogen.
Nov. 2	10	14·3	14·3	None.	None.
4	10	13·8	14·4	,,	,,
10	10	13·4	14·4	Present.	,,
11	10	14·6	14·5	,,	,,
15	10	14·0	14·4	,,	,,
16	10	13·2	14·2	,,	,,
18	10	13·9	13·9	,,	,,
22	10	14·2	14·7	,,	,,
23	10	14·0	14·7	,,	,,
24	10	13·4	14·6	,,	,,
28	10	13·8	14·5	,,	,,
30	10	14·9	15·2	,,	,,

The maximum illuminating power was 15·2, the minimum 13·9, and the average 14·5 candles. Of impurities, ammonia was present on only two occasions. Sulphuretted hydrogen was invariably absent. Sulphur was present to the extent of 23·53 grains per 100 cubic feet.

THOS. STEVENSON.

Register of New Patents.

3146.—ROBERT JOHN EVERETT, of West Ham, in the co. of Essex, for "*An improved process for the manufacture of salts of ammonia from ammoniacal gas liquor.*" Provisional protection only obtained. Dated Oct. 30, 1869.

This invention consists in the treatment of ammoniacal gas liquor with as much crystallized or anhydrous sulphate of iron (green copperas) as it can decompose, the result of such decomposition being sulphate of ammonia in solution and a precipitate of oxide and sulphide of iron.

3181.—JOHN PRENTIS HAWLEY and EDWIN EVERED HILL, both of Brixton, in the co. of Surrey, for "*Improvements in apparatus for controlling the flow of water from constant supply-pipes.*" Patent dated Nov. 2, 1869.

This invention consists in constructing the tap with a partially rotating plug, as in an ordinary cock, of a length sufficient to allow of its fitting into two sockets placed on the pipes of supply and delivery, which latter are disposed parallel to each other. The plug, which is preferably formed of two truncated cones placed base to base, is provided with two ways for the passage of the water placed at an angle with one another, so that when the passage through the one pipe is opened that through the other will be closed, and *vice versâ*. These cones, through which the water-ways are made, are received in the sockets before mentioned, which are also conical, and are so constructed as to prevent any leakage which might otherwise take place by the wear of the tap after but little use. The sockets are closed at the outer or smaller ends, and are each formed with a short section of pipe on either side for connexion with the supply and delivery pipes, and may be provided with projecting lugs serving to connect the sockets together by means of screw nuts.

3186.—HENRY JAMES HOGG KING, of Glasgow, in the co. of Lanark, N.B., engineer, for "*Improvements in apparatus for measuring, indicating, and regulating the flow or passage of liquids.*" Patent dated Nov. 3, 1869.

The first improvement admits of a comparatively small meter being used, the supply-pipe being fitted with a small branch, which leads a portion of the liquid through the meter, whence it passes on by a small pipe into a small cylinder provided with a piston, and having an outlet slit in its side. The piston moves a large valve through which the main portion of the liquid passes, and proportionately opens the outlets from the meter and from the supply-pipe. The second improvement consists in shifting the valve of a reciprocating liquid-meter by means of the alteration that takes place at the end of each stroke in the pressure of the liquid in the port which is at the time acting as outlet.

3182.—SIGISMUND LEONI, of 34, S. Paul Street, New North Road, in the co. of Middlesex, manufacturer, for "*Improvements in apparatus for cooking and lighting by gas.*" Patent dated Nov. 3, 1869.

This invention relates, with reference to cooking apparatus, to kitchen ranges, and consists in the construction of an open or unenclosed range composed of a frame (by preference of gas-piping) and open gas-rings similar to those described in specification No. 3124, dated Oct. 12, 1868. Fitted to the said frame are a series of shelves to receive culinary vessels and articles. The gas-rings are supported as required by portions of the said frame in such a manner as to admit of various kinds of food being arranged over and under the gas-rings, so as to be cooked by the heat radiating therefrom by the aid of heat reflectors and heat diffusers, arranged in modes similar to those described in the specification above referred to. The open or unenclosed frame of the range may be constructed otherwise than as composed entirely of gas-piping, but in any case an arrangement of gas-pipes is required in order to convey gas from the meter to the gas-rings. The range is, or may be, supported on wheels or castors to admit of its being readily moved from one part of a kitchen to another.

The invention, with reference to lighting apparatus, consists in the adaptation and application to gas-burners of a chamber in the shape of a cap or cover composed of adamas, steatite, soapstone, or other clay material forming a bad conductor of heat, and thus capable of becoming readily heated, and retaining the heat in the said chamber, through which the gas passes, and becomes heated just before it emerges from the outlet aperture or apertures of the burner. By this means the illuminating power of the gas is considereably increased, and the consumption of gas is reduced.

3187.—THOMAS STEPHEN MARTIN, of Plymouth, in the co. of Devon, wine merchant, for "*Improvements in the construction of self-acting stop-cocks.*" Provisional protection only obtained. Dated Nov. 3, 1869.

This improved cock consists of a tube, one end of which is inserted into the receptacle which contains the liquid, and the other end being provided with an exit opening or pipe. The forward portion of the tube behind the exit opening or pipe is constructed of a conical form, and a conical plug is placed therein, the same being mounted on a rod which passes through the centre thereof. The rod is mounted in suitable bearings at the forward and rear ends of the tube, the forward end of the rod being furnished with a knob or head, by which it may be actuated. In its normal position, the conical plug fits tightly into the conical portion of the tube, but upon pressing the knob or head of the rod it is forced backwards, thus allowing the liquid to pass in a forward direction, and to flow out of the exit opening or pipe.

3198.—MATTHEW WILSON, of 15, Wellington Street, in the borough of Southwark, in the co. of Surrey, gentleman, for "*Improvements in stink-traps.*" Patent dated Nov. 4, 1869.

These improvements consist in the construction of an ordinary shaped stink-trap without the bell, a cylinder pierced with holes or slots passing through the hole or flange in the bottom. At the top of the cylinder is a cap large enough to cover the flange at the bottom of the trap in the same manner as the lid of a pill-box. When on the box, the edge of the flange and inside the rim of the cap may be ground, making close-fitting surfaces, or the cap supplied with a washer of india-rubber, cork, sponge, hemp, or any other suitable material, so that when the cap is forced down upon the flange by means of a spring around the cylinder and beneath the trap it is impossible for water to run down or stench to arise. To the cap is fastened a rod passing upward through the grating of the trap, enabling the cylinder to be drawn up a certain distance, and fastened by means of a pin put through a hole pierced in the rod, thus forming a bell-tap when in use. Upon removing the pin from the rod the trap is completely closed down.

3216.—PETER WALKER and ANDREW WALKER, both of 32, Brougham Road, Dalston, in the co. of Middlesex, gas-meter makers, for "*An improved gas-meter.*" Patent dated Nov. 8, 1869.

This invention relates to dry meters, and consists in a wholly improved construction whereby increased simplicity and efficiency are combined, and the cost of manufacture and repairs greatly reduced; whilst the meter being much smaller than other descriptions of meters constructed for registering a like consumption of gas, economy of space is also effected. It consists, first, in the method of fixing the leathers of the diaphragms, both to the body of the meter and the discs of the diaphragms; secondly, in fixing the diaphragms opposite an opening in the body of the meter; thirdly, in a method of attaching the valve-box of the meter; fourthly, in the relative positions of the slide-valves, and likewise the double crank for working the same.

3224.—ALEXANDER CARNEGIE KIRK, of Glasgow, in the county of Lanark, North Britain, engineer, for "*Improvements in or connected with retorts.*" Patent dated Nov 9, 1869.

This invention of improvements in or connected with retorts is applicable to all retorts from which the residues are drawn or removed through a water lute that prevents the escape of vapour, and it consists, according to one modification, in arranging one or more bars to reciprocate slowly between the discharge mouth of the retort and the bottom of the pan or trough containing the water, by which bar or bars the residues from the retort are pushed over the edge of the trough at each side alternately, and fall thence into waggons or other receptacles.

These improvements, whilst applicable to various kinds of retorts, are more particularly designed for vertical retorts, and in constructing such retorts it is preferable to make the body in two lengths, and to fix in at the joint a shell extending downwards therefrom, so as to form a jacket space, into the top of which the steam or other gas or vapor which is usually introduced into such retorts is admitted, and from the bottom of which it issues into or among the shale or other substance which is being distilled.

The apparatus may be modified in various ways; it may be arranged to deliver the residue at one side only of the retort or retorts. Also one or more bars may be arranged on a pair of endless chains suitably guided, and made to reciprocate or move continuously in one direction in any convenient way, the chains in the latter case returning beneath the trough.

It is one advantage of this improved construction of the retort that the steam, vapour, or gas led into the jacket space becomes superheated therein before it acts on the substances in the retort.

3238.—JAMES INGLETON, of Glasgow, in the co. of Lanark, N.B., plumber, for "*Improvements in water-closets.*" Patent dated Nov. 10, 1869.

According to this invention the main discharge-valve is slightly conical, made by preference of vulcanized rubber of the section shown, that is to say, with the part which fits to the conical seat in the form of a tapered flange or lip projecting downwards and open below so as to be flexible. This valve works vertically, being fixed directly upon the handle-rod, and having fixed on it a cast-iron block, which acts as a weight to ensure the valves closing when the handle is let go, and which is shaped so that paper or other matter may not rest on the top of it.

3311.—PAUL NEGRIN, of Marseilles, in the empire of France, gentleman, for "*An improved arrangement for regulating the flow of liquids through pipes, valves, cocks, or other conduits.*" Provisional protection only obtained. Dated Nov. 17, 1869.

This invention consists in providing in the interior of the parts of pipes, valves, cocks, and other conduits, one or more perforated or reticulated partitions or diaphragms of wire gauze, perforated metal, or other plate of any suitable material or shape, through the meshes or perforations of which the liquid is obliged to pass for the purpose of properly regulating the flow of it, and at the same time arrest part of the impurities contained therein, provision being made for easily cleaning or replacing the said diaphragm or diaphragms.

3322.—JOHN WOODWARD, of Queen's Foundry, New Islington, Ancoats, in the city of Manchester, in the co. of Lancaster, engineer, for "*Improvements in gas and water or other liquid meters.*" Patent dated Nov. 18, 1869.

These improvements relate to an arrangement of valves applicable to diaphragm and piston meters measuring under pressure or with variable pressure, and consist in arranging an elastic diaphragm in the valve-chest above the valve, and in jointing to the back of the slide-valve one end of a rod which is jointed at its other end to a plate secured in the said elastic diaphragm, which is of such area as to place the valve in equilibrium, or nearly so, in respect to the pressure within the valve-chest, and in connecting the exhaust-passage of the valve by means of a pipe or passage with the outside of the said elastic diaphragm, so that any pressure in the outlet from the meter will act upon the said diaphragm and counteract the pressure acting under the valve, tending to lift it from its facing; by this means the valve is placed in equilibrium for all pressures, however the pressure may vary under the valve, so that it can be worked in all cases with ease and certainty by a small tumbler-weight lever.

The improvements also relate to an arrangement and combination of mechanism for working the slide-valve in diaphragm, piston, or bellows meters, and consist in connecting a piston-rod with the diaphragm, piston, or bellows of the meter, which works in a hood or cap, and in causing two stops or bowls in a slot in this rod to act upon a lever to produce oscillations in a shaft, one end of which passes through a stuffing-box and has the tumbler lever and weight placed upon it, which tumbler lever also works the index mechanism of the meter. The said oscillating shaft, by a finger upon it within the measuring cavity of the meter, gives motion to the slide-value through the port for that side of the measuring cavity of the meter, thus simplifying the mechanism, and dispensing with the necessity for more than one stuffing-box in working the valve and index.

The improvements further relate to diaphragm meters, and consist in an arrangement and combination of parts—namely, the diaphragm of india-rubber, or other suitable elastic material, is secured between two plates or castings, which are concave towards the diaphragm to form a measuring cavity, and the surface of the cavities in the castings are made of trumpet form, so that as the diaphragm moves the gas or liquid will be gradually expelled from the circumference to the centre, where the passage begins leading to the valve, which is arranged and worked as described under the first or both the first and second heads of the invention.

3337.—RICHARD KERR MILLER and ABRAHAM BURBERY HERBERT, both of Edinburgh, in the co. of Mid Lothian, N.B., for "*Improvements in pumps.*" Patent dated Nov. 19, 1869.

This invention consists in employing india-rubber balls in substitution of the ordinary valves, the balls resting on either rough or smooth seats of cast iron or other metal. In place of using india-rubber balls as the valves, the balls may be made of cast iron or other suitable material, in which case the seats are made of india-rubber. Stops or boxes are provided to regulate the lift of the valves, and the valves, in whichever way arranged, are applicable to single or double acting pumps.

3385.—FREDERICK FOSTER, of Lansdowne Cottage, Essex Road, Islington, in the co. of Middlesex, for "*Improvements in pressure-gauges.*" Provisional provisional only obtained. Dated Nov. 23, 1869.

In carrying out this invention a diaphragm is employed as heretofore, on which the steam or fluid of which the pressure is to be measured is caused to act in such manner as to deflect it more or less proportionally to the pressure. This diaphragm is arranged paralled to the dial or front of the instrument, and is connected therewith by toggle levers. These levers carry between them a rack, which is thus caused to move in a direction parallel to the dial. When the diaphragm is deflected, the rack, in so moving, drives a pinion on the axis of the index or hand of the instrument, which in this way receives its motion.

3395.—JOHN BIRCH PADDON, civil engineer, of Hove, in the co. of Sussex, for "*Improvements in apparatus used in the manufacture of gas.*" Patent dated Nov. 24, 1869.

This invention relates to improvements in apparatus for scrubbing and washing coal or other illuminating gas for the purpose of removing the ammonia and other impurities incidental to its manufacture, and consists in constructing a chamber of cast or wrought iron or other suitable material, by preference of a rectangular form in plan and in elevation, flat at the bottom, with vertical sides and semicircular top. Within this chamber, and projecting beyond at one or both ends, a shaft is made to revolve by steam or other suitable power. Attached to this shaft within the chamber are a number of radial arms, each set of arms being connected together by flat circular rims of metal, so arranged as to be concentric with, and approach very closely to the semicircular top. Between the arms, and extending slightly beyond the rims, cocoa-nut matting or other suitable material is stretched so as to form a number of highly porous discs, the matting beyond the rims being made with a fringe or brush-like edge, which, while it fills up the interstices between the rims and the semicircular top, offers but little impediment to the free revolution of the discs. Water or other suitable liquid is admitted to the chamber to such a height as to ensure the discs being thoroughly wetted at every revolution.

3396.—DAWSON MILES, of Boston, Massachusetts, U.S.A., for "*An improved mode of, and apparatus for, lighting and extinguishing gas by electricity.*" A communication. Patent dated Nov. 24, 1869.

Electrical apparatus or mechanism has been heretofore used for lighting and extinguishing gas, a ratchet-wheel which forms part of such mechanism being connected with the gas cock or valve, and rotated by a pawl operated by an electro-magnet. This apparatus or mechanism is, however, objectionable for the following reasons:—Where many lamps or burners are placed in a circuit it has been found impossible to so regulate the mechanism connected with each lamp or burner as to cause the ratchet-wheels to be moved the same distance at each forward vibration of the pawls, the momentum received from the rapid action of the latter causing some of the ratchet-wheels to be carried beyond the desired point, the gas being thereby turned on in some places, while in others it is partially or entirely shut off. Furthermore, where many lamps are included in the same circuit, so that the several series of such apparatus are operated simultaneously, a very powerful current of electricity is required, which necessitates the employment of a wire of large diameter, thus increasing the expense.

The first part of this invention relates to means for overcoming the above-mentioned difficulties, and consists in operating only one apparatus at a time, two separate wires being employed (one to turn on and the other to shut off the gas) in connexion with an automatic circuit breaker in each apparatus. The current of electricity passes through one wire to the electro-magnet of the first apparatus in the circuit (returning through the ground), and as soon as the gas-valve of this apparatus has been opened or closed the motion of the mechanism connected therewith is arrested by the breaking of the circuit, the current being by the same movement of the automatic circuit breaker connected with a wire leading to the next apparatus, when the operation is repeated, and so on throughout the whole series of lamps. Thus it will be seen that one apparatus only is included in the circuit at a time, the breaking of the circuit in each apparatus serving to connect the electro-magnet with the other wire, by the current of which the mechanism may be again set in motion, the two wires being used alternately, one to turn on and the other to shut off the gas.

The second part of this invention relates to certain improvements in that portion of the apparatus used for igniting the gas by an electric spark. Where many lamps are included in a circuit and lighted simultaneously, as has heretofore been customary, the electric spark has to leap over a corresponding number of breaks, one at each gas-burner. To overcome the aggregate resistance occasioned by these breaks an exceedingly powerful current of electricity is required, necessitating an expensive covering of great thickness around the conducting wire in order to secure the required insulation to prevent the escape of the electricity. This part of the invention has for its object the prevention of such great expenditure of electric power; it also enables a thinly-coated, and consequently less expensive, conducting wire to be employed, and consists in breaking and closing the electric lighting circuit at any desired point for the purpose of producing the sparks to ignite the gas by means of automatic mechanism.

3398.—SAMUEL CHATWOOD, of Bolton, in the co. of Lancaster, safe and lock engineer, and THOMAS STURGEON, of Manchester, in the co. of Lancaster, engineer, for "*Improvements in apparatus for forcing and drawing fluids and liquids.*" Patent dated Nov. 24, 1869.

This apparatus consists of a cylindrical chamber, in which two arms or vanes revolve round the same axis, but independently of one another. These arms or vanes do not travel round at one uniform speed, but they have a motion imparted to them which is quick in one part of the revolution and slow in another part, and the gearing is so arranged that one of these arms shall be travelling at its quickest speed whilst the other is at its lowest speed. The effect of this motion is that up to a certain point one of the arms is constantly gaining on the other, and thus decreasing the space between them on one side and increasing it on the other side. Suitable openings are formed at certain positions in the cylindrical chamber, and the necessary consequence of the peculiar motion imparted to the arms or vanes is that the fluid or liquid is forced out through one of these openings and drawn through the other, and this effect is constantly going on, for as each arm in turn approaches the position in which it moves slowest, the other is constantly gaining speed.

3463.—ALFRED WILLMER POCOCK, of No. 4, Claverton Street, Pimlico, in the co. of Middlesex, engineer, for "*Improvements in meters or apparatus for measuring water and other liquids.*" Patent dated Nov. 30, 1869.

This invention relates to the construction and employment of apparatus for measuring the quantity of water or other liquid, and is intended for indicating the quantity supplied to dwelling-houses, factories, and other places in which the quantity furnished is to be charged for or where it is required to ascertain the quantity used.

The invention consists in fitting two cylinders or cases side by side. Both cylinders are supplied with water or other liquid at each end. The area of each cylinder and the stroke of each piston being of determined dimensions, so that at each stroke of the pistons a given quantity is passed into the outflow pipe, while at the same time the number of strokes are registered on a dial or other indicating medium, thus indicating at a glance the number of gallons or other determined quantity supplied within a fixed period. The registering apparatus may also be furnished with index-hands, showing the amount necessary to be paid for the quantity used. The pistons are provided with rods which are connected with cranks on a shaft or axle, on which a valve-plug or key of peculiar construction is fixed, and which rotates with the shaft to direct the incoming water into channels leading to one end of the cylinders, and to direct the effluent water from the other ends of the cylinders to the outflow-pipe, there being a division in the plug or key to separate the incoming from the outgoing water. The plug or key of the valve is formed of two discs fixed or cast concentrically to one another upon a bar which holds them a convenient distance apart, and which passes diametrically across each. Each disc has a hole through it at right angles to its plane, the hole in one disc being on the opposite side of the separating bar to the hole in the other disc. The plug is turned to fit the seating in which it is placed in such a manner that the openings of the ports in the seating shall be enclosed between the discs of the plug. The liquid is admitted to one side of the plug (in the case of the valve being made taper it is preferred to admit the liquid to the larger end) when it passes through the hole before described into the space between the discs on one side of the separating bar, and from thence passes through the ports that may be in communication with that side of the plug at the time being and acts upon the pistons, causing the liquid on the opposite side of the pistons to issue from the ports in communication with the other side of the plug, and so out of the hole in the second disc into the outflow-pipe. The patentee does not confine himself to the above-described mode of leading the water through the plug, as the entrances may be at the edge and the outlets at the back and front. The shaft or axle can be fitted with a toothed wheel for actuating the dial and registering mechanism.

Although it would be inferred from the foregoing description that horizontal plugs are employed, in some cases the plugs are fitted to work vertically. In that case a bevel wheel is secured on the shaft, and caused to gear into a pinion on the plug head.

3479.—FELIX NAPOLEON TARGET, of Colyton, in the co. of Devon, gentleman, for "*Improvements in water-closets.*" Patent dated Dec. 1, 1869.

These improvements are applicable to all water-closets, but more particularly to pan closets, and consist, first, in a particular form of valve or cup for the bottom of the basin as a substitute for the valves or cups now in use. Second, in fitting a funnel-shaped receiver to the bottom of the pan, to receive the excrement and lead it into the soil-pipe. Third, in fitting a waste water-pipe to the bottom of pan, to carry off the water which collects round the funnel above mentioned and lead it into the sewer or drain. Fourth, in arranging the mechanism so that the valve to the basin is made to open automatically when a person sits on the seat or when the cover is raised, and to close at the moment the water is admitted, instead of opening as usual.

3495.—EDWARD FIELD, of Chandos Chambers, Adelphi, in the city of Westminster, consulting engineer, for "*Improvements in valves for steam fire-engine and other pumps.*" Patent dated Dec. 2, 1869.

This invention consists in making the elastic valves by preference circular in plan, and either flat like washers, or coned, or of other suitable form, and to use two such elastic valves placed face to face with their outer circumferences pressing against one another like lips. For the purpose of securing them firmly in their relative positions so that they may be enabled to stand considerable back pressure, their inner portions are compressed or held between suitable adjustable coned or other plates or rings, and corresponding seat-plates or edges are formed with or attached to the main body or other support.

3499.—JOHN CHARLES WILSON, of 26, Martin's Lane, Cannon Street, in the City of London, mechanical engineer, for "*An improved revolving engine and pump, applicable as a fluid-meter.*" Patent dated Dec. 3, 1869.

This invention consists, first, in the employment of recesses in the end cover or covers of the external fixed cylinder of revolving engines and pumps and meters; secondly, the employment of outer recesses in the piston slides of revolving engines and pumps and meters; thirdly, in the employment of inner recesses in the piston slides of revolving engines and pumps and meters; fourthly, in constructing revolving engines with two or more cylinders, of different sizes, to exhaust one into the other; fifthly, in constructing such revolving engines, in combination with slide-valves on each cylinder, worked at the same time, for the purpose of reversing the engine; and sixthly, in placing a throttle-valve, worked by the governor in the exhaust-pipe of revolving engines, to regulate their speed, also in the delivery-pipe of revolving pumps, worked by revolving engines, to regulate the delivery of water from the pump.

3512.—JOHN KNOWLES, of Burnley, in the co. of Lancaster, for "*Improvements in rotary engines to be worked by steam, air, water, or other fluid, which improvements are also applicable for raising fluids.*" Provisional protection only obtained. Dated Dec. 4, 1869.

This invention consists principally of a cylinder or circular chamber divided into two equal compartments by a fixed partition or diaphragm. Through the centre of this double cylinder passes the axle, upon which are keyed or otherwise fixed circular blocks, which are of the same width as the interior of the cylinders, and are provided with pistons or projections fitting in the space between the outside of the circular blocks and the inside circumference of the cylinders, the pistons being placed on opposite sides of the axle in the two cylinders so as to avoid having any dead plate.

3517.—ABRAHAM RIPLEY, of 34, West Square, St. George's Road, Southwark, in the co. of Surrey, and JOHN WORMALD, of 103, Blackfriars Road, Southwark, in the said co., engineer, for "*A new or improved pipe-wrench.*" Patent dated Dec. 4, 1869.

This invention consists simply of the two jaws of the wrench being spread open to form the mouth in which the pipe to be turned is inserted; one of the jaws is plain and the other is formed with ratchet teeth. Pipes, such as those used for gas and water, round rods, stems, &c., can be screwed up or unscrewed by means of these wrenches in an easy, simple manner, as they have only to be placed upon the article, when the tooth which touches it will bite with sufficient power to prevent it slipping. There are several advantages in this wrench over those of other make, as there are no loose parts to adjust or to get out of order. One wrench will serve for many sizes of pipes, as the end of the jaws may be, say, 1 inch apart, and the bottom only ¼-inch, when those sizes and all between them can be caught hold of and twisted by it.

3520.—SAMUEL CHATWOOD, of Bolton-le-Moors, in the co. of Lancaster, safe and lock engineer, and JAMES CROMPTON, of Bolton-le-Moors, in the co. of Lancaster, engineer, for "*An improved self-acting escape-valve for drawing off the condensed fluids from steam-engines, pipes, and other steam-vessels.*" Patent dated Dec. 4, 1869.

In carrying out this invention there is applied to the waste water-pipe of the engine, cylinder, or such other steam-vessel as the apparatus may be used for, an apparatus consisting of a short vertical pipe open at the top, which should be at a lower level than the cylinder or other steam-vessel. Around the upper part of the pipe is formed a valve-face, the face being downwards. The upper part of the pipe, with the valve-face above mentioned, is enclosed within a small vessel closed at the top, and having at its lower end a neck which fits on a parallel part of the pipe below the valve-face, and carries a corresponding valve-seating set with its face upwards, so that when the vessel is lifted up the valve and seating are in close and steam-tight contact, and when the vessel drops the seatings separate, and allow any fluid contained in the vessel to escape through grooves or openings left in the neck.

3522.—THOMAS PRIDEAUX, of Sheffield, in the co. of York, for "*Improvements in purifying and calcining gas and soap limes, and other chemical refuse of lime which has been used in the manufacture of such articles.*" Patent dated Dec. 6, 1869.

The object of this invention is to prepare the refuse lime from the purifiers of gas-works, which is known as gas lime, in such a manner that it may be used either alone or in admixture with same, iron scale, or other similar materials for cement, concrete, or for the formation of blocks to be used for constructive purposes.

In order to carry out this invention the gas lime is taken and thoroughly incorporated with the substances formed by the passing of the gas through the lime with the portion of the lime which may yet remain in the caustic state. This mixture is accomplished by grinding the said gas lime in a mortar-mill or other suitable machine, and by preference the gas lime is used as dry as it can be obtained, although in some cases water may be added with advantage. By this process the oxidation of calcium sulphides is promoted, and a mixture is produced which hardens in a short time, so that the material when thus prepared can be used alone for plaster, concrete, or cement, and also for the formation of blocks to be used for constructive purposes. A mixture of sand or similar material, in the proportion of one-third of sand to two-thirds of gas lime, may also be used, and with the mixture a concrete suitable for building sea-walls or other similar constructions is made. Iron scale and colouring matters are also used when required for decorative purposes. By the afore-mentioned treatment it is found that the sulphides and other offensive compounds are so much oxidized that the prepared gas lime can be used for the interior work or decoration of dwelling-houses. The substance upon hardening is quite free from unpleasant smell, and is of a light grey colour. If the proportions of lime remaining in a caustic state be insufficient a suitable quantity of quicklime is added when using the prepared gas lime for the formation of blocks or for cement, plaster, or mortar.

The invention also consists in submitting the gas lime, prepared in the manner hereinbefore described, to a calcination at a regulated temperature. This part of the invention is performed in a suitable kiln, which may be of the kind ordinarily used for lime-burning. By this operation a material is produced which, pulverized and passed through a sieve, is used for blocks, cement, or concrete, either with or without admixture with same, iron scale, or similar substance. The calcined prepared gas lime is of a stone colour, and when mixed with water and used as cement or concrete sets in a short time, forming a very hard mass, suitable for building sea-walls and for other constructive purposes.

3524.—HUNTER HENRY MURDOCH, of 7, Staple Inn, in the co. of Middlesex, patent agent, for "*Improvements in and apparatus for forming and joining the ends of iron and other tubes or pipes.*" A communication. Patent dated Dec. 6, 1869.

This invention consists of improvements on a former invention, No. 3136, dated Nov. 28, 1866. That invention relates to certain arrangements whereby metallic tubes or pipes are connected with each other by means of a strip of rolled lead placed round the ends of the pipes to be joined, the said lead being forced into hollows or channels formed in the outer surface of the pipes, and secured in position by a hoop of wrought iron driven over the lead.

The present invention consists, firstly, of the improved mode hereinafter described of forming the joints of pipes or tubes, whereby greater simplicity and economy are obtained. The ends of the pipes on the outside are formed of rather greater diameter than the body of the said pipes, tapering down so as to form a conical collar or projection round the ends of the said pipes. A strip of lead is shaped by casting or rolling so as to fit the conical projections on the ends of two pipes, and the said strip of lead is formed with a central rib underneath, which said rib projects into a space left between the ends of the pipes to prevent them from touching each other, and to allow of their expanding. The said strip of lead is placed round the respective ends of the pipes, and its two ends are joined by a tenon formed on one end of the strip, taking into a channel or space cut in the other end of the said strip to receive the said tenon. The said strip is held in position, and pressed on to the ends of the pipes by a band of iron rolled specially for the purpose, its lower surface being shaped to fit the lead on the pipe ends, and its upper surface being slightly conical—that is to say, thicker on one side than on the other. The said band of iron is bent round to form a ring or hoop, which can open to pass on to the lead, and its diameter being rather smaller than that of the lead the said ring or hoop forms a circular spring to press upon the said lead, and hold it in position, and the said iron hoop or circular spring is further pressed on to the lead, and its ends are caused to meet, or nearly so, by a press collar of the following construction:—A piece of iron is formed at its lower end in shape like a crescent or a portion of a circle, to fit and rest upon the circular spring on the pipe ends. On the upper surface of the said crescent piece is a lug projecting upwards, to which is jointed one end of a lever, and also one end of a belt of iron or steel, which said belt passes round the circular spring on the pipe ends, and is jointed at its other end to the said lever at a little distance from that end which is jointed to the projecting lug of the crescent piece. By turning the lever the belt is drawn tight round the pipe ends, and closes the circular spring upon the lead, compressing the said lead, and forming a perfectly tight joint. The circular spring being thus firmly fixed, a ring or hoop, the inner surface of which is conical, to fit the outside conical surface of the circular spring, is driven on to the said spring, and firmly binds the whole together. In some cases two binding hoops may be used, one on each side of the joint. The protruding or superfluous portions of lead are then punched up, as is usual in such cases.

This invention consists further of the improved mode hereinafter described of moulding the ends of the pipes to be joined together according to this invention, in order to the said ends and the conical collars or projections upon them being cast perfectly smooth and regular. A circular bottom plate is formed with a lug on each side, through each of which lugs passes a key-bolt. Upon the said bottom plate is mounted an iron cylinder, with lugs corresponding with the lugs on the lower plate. The said cylinder is formed of two half cylinders, being divided longitudinally through its axis or centre, and through the said lugs, so that the two half cylinders may be separated laterally, but being keyed to the lower plate cannot rise. The said half cylinders are secured together by a hoop of iron placed round them. The pattern of the pipe end having the conical collar or projection upon it is divided into five segmental pieces, each formed at the back with a dovetail groove, into which takes a dovetail projection upon a conical centre-piece moved by a handle. The said pattern is placed in the centre of the cylinder and bottom plate, and the space between the cylinder and the pattern is filled with moulding sand, which being suitably pressed and stamped forms the mould for the outside of the pipe. In order to take the said mould out of the frame without injuring it, the iron hoop is taken off the outside cylinder, which then separates into two pieces, which may be easily removed. The centre-piece is then removed from the segmental pattern, and each of the segments may be taken out without injury to the mould, which is then ready for use, and may be added on to the mould of the body of the pipe.

The invention consists also in apparatus for giving back to the circular springs above mentioned their exact sectional shape, which may have been injured during the process of bending them into a circular form. For this purpose a cylindrical die, the inner surface of which is conical, to suit the required shape of the outside of the circular spring, is mounted on an iron annular plate, and secured thereto by bolts or studs. The circular spring having been driven into the said die, three or more segmental dies, having on their outward surface the required shape for the inner surface of the said circular spring, are placed within the said spring, and by means of a conical plug driven into the centre of the segmental dies, the said dies are forced against the inner surface of the said spring, and give it its required shape.

APPLICATIONS FOR LETTERS PATENT.

3060.—WILLIAM RICHARD POOK, of 9, Vaughan Parade, Torquay, in the co. of Devon, for "*Improvements in ventilating sewers by apparatus adapted for that purpose.*" Nov. 23, 1870.

3062.—WILLIAM ROBERT LAKE, of Southampton Buildings, London, consulting engineer, for "*Improvements in gas-regulating apparatus.*" A communication. Nov. 23, 1870.

3071.—CHARLES MENDEL JOSEPH, of Grosvenor House, South Place, Kennington Park, in the co. of Surrey, for "*Improvements in filters.*" A communication. Nov. 24, 1870.

3079.—WILLIAM NUNN, of Oak Lodge, Bushey Hill, Peckham Road, in the co. of Surrey, for "*Improvements in traps to drains and other places.*" Nov. 24, 1870.

3080.—WILLIAM PRANGLEY, of Salisbury, in the co. of Wilts, for "*Improvements in commodes or portable water-closets.*" Nov. 24, 1870.

3081.—JOHN PENN, jun., of the Steam-Engine Works, Greenwich, in the co. of Kent, engineer, and WILLIAM HOUNSELL, also of the above-named works, coppersmith, for "*Improvements in the manufacture of curved metal pipes.*" Nov. 24, 1870.

3086.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in earth-closets.*" (Complete specification.) A communication. Nov. 24, 1870.

3107.—AMOS BRYANT, of Heavitree Road, Exeter, and SAMUEL HALL CULLEY, of St. Sidwell's Cottage, in the city of Exeter, both in the co. of Devon, for "*Improvements in deodorizing and treating sewage, and in apparatus to be employed for this purpose.*" Nov. 26, 1870.

3159.—HENRY DOULTON, of High Street, Lambeth, in the co. of Surrey, for "*Improvements in the construction of irrigation conduits or channels for the conveyance and distribution of sewage and other waters.*" Dec. 1, 1870.

GRANTS OF PROVISIONAL PROTECTION.

2959.—EDWARD PRIMEROSE HOWARD VAUGHAN, of 54, Chancery Lane, in the co. of Middlesex, patent agent, for "*Improvements in the construction of and in the methods of working gas-engines.*" A communication. Nov. 10, 1870.

2965.—WILLIAM ARMAND GILBEE, of 4, South Street, Finsbury, in the co. of Middlesex, patent agent, for "*An improved water-meter, parts of which are applicable for other purposes.*" A communication. Nov. 11, 1870.

2972.—RICHARD POTTER PEARN and FRANK KELSEY PEARN, both of Manchester, in the co. of Lancaster, for "*Improvements in machinery for raising and forcing fluids.*" Nov. 12, 1870.

2974.—AUGUSTUS GEORGE VERNON HARCOURT, of Christchurch, in the city of Oxford, for "*Improvements in the purification of gas.*" Nov. 12, 1870.

2991.—JOHN BRUNTON, of Great George Street, in the city of Westminster, civil engineer, for "*Improvements in meters for water or other fluids.*" Nov. 15, 1870.

3060.—WILLIAM RICHARD POOK, of 9, Vaughan Parade, Torquay, in the co. of Devon, for "*Improvements in ventilating sewers by apparatus adapted for that purpose.*" Nov. 23, 1870.

3062.—WILLIAM ROBERT LAKE, of Southampton Buildings, London, consulting engineer, for "*Improvements in gas-regulating apparatus.*" A communication. Nov. 23, 1870.

3080.—WILLIAM PRANGLEY, of Salisbury, in the co. of Wilts, for "*Improvements in commodes or portable water-closets.*" Nov. 24, 1870.

INVENTION PROTECTED FOR SIX MONTHS ON THE DEPOSIT OF A COMPLETE SPECIFICATION.

3086.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in earth-closets.*" A communication. Nov. 24, 1870.

NOTICES TO PROCEED.

1976.—WILLIAM COWLEY, of Liverpool, in the co. of Lancaster, for "*Improvements in the apparatus for pumping and forcing air and other fluids, and which apparatus is peculiarly applicable to desiccating, the ventilation of mines, buildings, ships, and other structures, and for blast and other purposes.*" July 13, 1870.

1980.—HENRY KESTERTON, of 9, Stratford Road, Birmingham, in the co. of Warwick, for "*Improvements in the manufacture of iron tubes, and in machinery employed therein, applicable also to the manufacture of tubes of other metals.*" July 13, 1870.

1988.—WILLIAM EDWARD NEWTON, of 66, Chancery Lane, in the co. of Middlesex, civil engineer, for "*Improvements in counting registers, applicable to counting the revolutions of shafts in various kinds of machinery, steam and other engine indicators for registering stroke or travel, indicators for gas or water meters, clocks, adding-machines, and registering devices of different kinds, or for various purposes.*" A communication. July 14, 1870.

2038.—AMBROSE LLOYD TAYLOR, of Aylesbury, in the co. of Bucks, gentleman, for "*Improvements in apparatus for warming, vaporizing, and causing a free circulation of fresh air in horticultural structures and other buildings, which apparatus is also applicable for the ventilation of mines and other places.*" July 20, 1870.

2063.—JABEZ JOSEPH MARRIOTT SILLS, of the town and co. of the town of Nottingham, tin, iron, and zinc plate worker, and portable closet manufacturer, for "*An improved combined portable water-closet, night-commode, and chamber-pail.*" July 21, 1870.

2071.—THOMAS HIGGS and JOHN ELLIOTT, of Holborn, in the co. of Middlesex, for "*Improvements in gas-regulators.*" July 22, 1870.

2081.—HENRY DOULTON, of High Street, Lambeth, in the co. of Surrey, for "*Improvements in stop-valves.*" July 23, 1870.

2224.—NICHOLAS DEMETRIUS SPARTALI, of Liverpool, in the co. of Lancaster, steam-ship agent, for "*Improvements in apparatus for compressing air and raising and forcing fluids.*" Aug. 10, 1870.

2951.—WILLIAM ROBERT LAKE, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improvements in apparatus for effecting and regulating the supply of the deodorizing material in earth-closets.*" A communication. Nov. 9, 1870.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

2878.—WILLIAM COWAN, "*Improvements in gas-meters.*" Nov. 17, 1863.

2912.—GEORGE RAIT and JOHN WINSBORROW, "*Improvements in the construction of dry gas-meters, and in the means or apparatus employed therein.*" Nov. 20, 1863.

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1 in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lb.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle and Middlesboro'.	Wales.	Yorkshire, Derbyshire, and Staffordshire.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Pig Iron, No. 1 (g.m.b.)	3 15 0	2 11 3	3 9 0	3 10 0	3 15 0
1½ and 2-inch Socket-pipes	7 0 0	5 15 0	5 10 0	6 0 0	7 0 0
2½ and 3-inch ditto	6 10 0	5 5 0	5 0 0	5 15 0	6 10 0
4 and 5-inch ditto	6 0 0	4 15 0	4 10 0	5 5 0	6 0 0
6 inches and upwards ditto	5 15 0	4 5 0	4 0 0	5 0 0	5 15 0
Retorts, 1st fusion, hot blast	5 10 0	4 10 0	4 5 0	5 0 0	5 10 0
Ditto, 2nd ditto, cold ditto	6 10 0	—	—	—	6 10 0
Tank-plates, ¾ thick and above	6 0 0	5 0 0	4 15 0	5 10 0	6 0 0

WROUGHT-IRON TUBING,

Subject to 60 per cent. Discount.

	2 in.	1½ in.	1¼ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 14 feet—per foot	1 8	1 1	0 10	0 7	0 5	0 4½
Ditto ditto, from 12 in. to 23½ in.—each	3 0	2 0	1 6	1 1	0 9	0 8
Long Screws, from 12 in. upwards	4 0	2 3	2 0	1 6	1 2	0 11
Bends and Springs	4 3	3 3	1 9	1 3	0 11	0 8
Square Elbows, equal or reducing; Round Elbows, 5 per cent. extra	3 9	2 3	1 9	1 3	0 10	0 9
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 9
Crosses, ditto, equal or reducing	4 9	3 6	3 0	2 3	1 9	1 6
Iron Cocks	20 9	13 0	10 0	7 3	5 0	3 8
Ditto, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and Nipples	1 3	0 9	0 8	0 6	0 5	0 4½
Plain Sockets	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 2-quart	15 0	14 0	13 6	13 0	12 0	—

SUNDRIES.

Best Newcastle Fire-bricks, per 1000	£2 10s. to £2 15s. 0d.
Cliff's Fire-bricks (at Wortley), per 1000	2 15 0
Ingham's ditto (at Wortley), per 1000	2 15 0
Farnley Iron Co.'s Fire-bricks (at Wortley), less discount	2 17 0
Fire-clay Retorts, per foot run	5s. 6d. to 0 7 6
Tarred Rope Yarn, per cwt.	1 0 0

FREIGHTS.

Coastwise—Newcastle:—	Per Ton.	*Foreign:—*	Per Keel.
	6s. 3d		£19 0s
Chatham and Rochester	9 0	Barcelona	13 0
Cork	6 9	Bordeaux	7 10
Dover, Folkestone, and Ramsgate	8 6	Boulogne and Calais	12 6
Dublin	9 0	Cadiz	—
Exeter Quay	6 0	Cronstadt	9 0
Ipswich	8 6	Copenhagen	17 0
London (from Leith)	6 3	Genoa	12 0
London (Pool)	5 0	Hamburg	18 0
Lowestoft and Yarmouth	7 6	Havre de Grace	11 0
Portsmouth & Southampton	9 6	Leghorn	9 10
Plymouth	7 6	Lisbon	14 0
Shoreham	6 9	Rotterdam	16 0
Whitstable	8 0	Stettin	19 0
Weymouth		Trieste	
		Venice	

GAS COALS.

Newcastle—Unscreened:—	Per Ton.
	6s. 6d.
Haswells, Nettlesworth Primrose, and South Pelaw	6 9
Felling, Framwell Gate, North Pelton, Redheugh Main, Walker's Primrose, West Wear, and Whitwell Primrose	7 0
Burnhope, Craghead, Chariaw, Derwent, East Castle, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Ravensworth, Seaham, South Moor Pelton, South Leverson, Townley Main, Tyne Main, West Pelaw, Wearmouth Hutton, and Witton	7 3
Pearth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	7 6
Brancepeth, Dean's Primrose, Londonderry Gas, New Pelton, Pelton, South Pearth, Stella, Urpeth, Washington Hutton, and West Leverson	17 6
Ramsay's Newcastle Cannel	17 0
Wigan Cannel (at Liverpool)	

Welsh Cannel:—

Coppa Cannel (on rails at Birkenhead), 13s. 6d.; ditto (on rails at Connah's Quay) . . 13 0

Scotch Cannel, f.o.b.:—	Per Ton.	*Scotch Cannel*, f.o.b.:—	Per Ton.
Boghead—at Bo'ness, 47s. 6d.; at Leith 48s. 2d		Arniston (at Leith)	21s. 0d
Muirkirk	27 0	Wemyss (at Wemyss)	20 0
Kirkness, best (at Burntisland)	22 6	Haywood Co.'s Haywood (at Granton)	20 0
Capeldrae, 1st quality (at ditto)	22 6	Pirnie, or Methill	17 0
Ditto, 2nd ditto (at ditto)	17 6	Lothian's Cannel (at Leith)	24 6
Cowdenbeath (at ditto)	12 0	Grange ditto (at Bridgeness)	17 6
Lochgelly (at ditto)	12 0	Kinniel ditto (at Bo'ness)	17 6
Donnibristle—at Burntisland, 12s.; at Aberdour	12 6	Myles' ditto	23 6
Auchinheath Lesmahago (at Granton)	27 0	Lochore Parrot (at Burntisland)	22 6
Duke of Hamilton's Lesmahago (at Granton)	27 0	Lanemark (at Glasgow)	16 0
		Elphinstone Tower (at Leith)	20 0

Share List of Metropolitan Gas Companies.

Number of Shares issued.	Amount per share.	Name of Company.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£		£ s. d.	£ s. d.	£
8000	10	Anglo-Romano	10 0 0	10 0 0	11 — 12
5000	20	Bahia (Limited)	20 0 0	3 0 0	13 — 14
1000	20	Do., preference	20 0 0	10 0 0	25 — 26
750	20	Do., do., redeemable	20 0 0	10 0 0	20 — 22
40000	5	Bombay (Limited)	5 0 0	4 10 0	6¼— 6⅝
10000	5	Do., third issue	4 0 0	4 10 0	5¼— 5⅝
10000	20	British (Limited) (Norwich, Hull-Seulcoates, Hanley, Tunstall & Shelton [Potteries), Trowbdge., & Holywll.)	20 0 0	10 0 0	30 — 31
7500	20	Cagliari (Limited)	20 0 0	7 0 0	
112000	10	*Chartered*	10 0 0	9 0 0	14½— 15⅝
8000	10	Do., A shares	5 0 0	9 0 0	6⅞— 6⅞
10000	10	Do., B shares, 4 per cent. max.	10 0 0	4 0 0	6⅞— 7⅛
25000	10	Do., 5 per cent. preference	7 0 0	5 0 0	9 — 9⅛
20000	10	Do., 10 per cent. preference	10 0 0	10 0 0	19 — 20
17490	25	*Commercial*	25 0 0	10 0 0	42 — 44
20000	20	Continental Union	20 0 0	8 0 0	24¼— 25
10000	20	Do., new	5 0 0	8 0 0	7⅞— 8¼
5213	20	Do., preference (France: Strasbg., Cette, Nismes, Montargis, Vienne, Roanne, Beaucaire, Rueil, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	24 — 26
5000	10	*Crystal Palace District*	10 0 0	10 0 0	16 — 16½
5000	10	Do., preference	10 0 0	6 0 0	11 — 11¼
10000	10	Do., new shares	10 0 0	7 0 0	12 — 12½
4000	50	*Equitable*	50 0 0	10 0 0	80 — 83
4000	25	Do., new shares	25 0 0	10 0 0	40 — 41½
23406	10	European (Limited)	10 0 0	11 0 0	15 — 15½
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	11 0 0	7¼— 8
5000	10	Hong Kong (Limited)	10 0 0	9 0 0	11 — 12
26000	50	*Imperial*	50 0 0	10 0 0	84 — 85
26000	10	Do., new shares	7 0 0	10 0 0	12 — 12½
26000	12½	Do., new shares	12 10 0	7 0 0	14¼— 15½
25000	12½	Do., new shares, 1870	2 10 0	7 0 0	4 — 4¼
1300	£100	Do., bonds	£100	10 0 0	175 —180
56000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam., Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Stolberg, Toulouse, & Vienna.)	43 15 0	9 2 6	64 — 65
400	100	Imperial Mexican (Limited)	100 0 0	nil.	
200	100	Do., new	100 0 0	nil.	
3000	40	*Independent*	40 0 0	10 0 0	64 — 65
3000	10	Do.	10 0 0	5 0 0	7 — 8
3000	20	Do.	15 0 0	7 10 0	17 — 18
7133	50	*London*	50 0 0	10 0 0	84 — 86
5610	25	Do., 1st preference	25 0 0	6 0 0	27 — 29
503	50	Do., 2nd preference	50 0 0	6 0 0	
214	50	Do., 3rd preference	50 0 0	6 0 0	
£18781		Do., 1st preference stock		6 0 0	
£11828		Do., 2nd preference stock		5 0 0	
		Nietheroy, Brazil (Limited)			
15000	5	Malta and Mediterranean (Limited)	5 0 0	4 10 0	3¼— 4
6000	5	Do., preference	5 0 0	7 0 0	4⅞— 5¼
20000	5	Mauritius (Limited)	2 0 0		2— 2¼
30000	5	Oriental (Calcutta)	5 0 0	10 0 0	8 — 8½
30000	5	Do., new shares	1 10 0	10 0 0	3¼— 3⅜
10000	5	Ottoman (Limited)	5 0 0	nil.	2— 2¼
14000	10	Pará (Limited)	10 0 0	10 0 0	10 — 11
27000	20	*Phœnix*	20 0 0	10 0 0	33 — 35
3600	100	Do., new	40 0 0	7 10 0	47 — 48
144000	Sk.	Do.	100 0 0	5 0 0	85 — 90
5000	20	*Ratcliff*	20 0 0	10 0 0	28 — 29
	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	28 — 29
6959	5	Singapore (Limited)	5 0 0	7 0 0	
2000	5	Do., preference	5 0 0	7 10 0	
1500	32½	Shanghai	32 10 0	12 0 0	
4000	50	*South Metropolitan*	50 0 0	10 0 0	87 — 90
4000	12½	Do.	12 10 0	10 0 0	21¼— 22
20000	12½	Do., new shares	2 10 0	10 0 0	6 — 6¼
15000	10	*Surrey Consumers*	10 0 0	10 0 0	15¼— 16¼
10000	10	Do., new	6 0 0	10 0 0	10 — 10½
9000	4	United General (Limerick)	4 0 0	5 0 0	2¼— 2⅜
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	10 — 12
1500	10	Do.	10 0 0	7 10 0	
1819	10	Do.	10 0 0	7 10 0	
1138	10	Do.	5 0 0	7 10 0	
20000	10	Western (Limited) A shares	10 0 0	10 0 0	16 — 17
10000	10	Do., B shares	8 0 0	10 0 0	14¼— 15
10000	10	Do., C shares	8 0 0	10 0 0	13 — 13½
10000	10	Do., D shares	1 0 0	10 0 0	2⅛— 3
20000	10	*West Ham*	5 0 0	8 0 0	7 — 7¼
18000	5	Do., new shares	1 0 0	8 0 0	
10000	5	West London Junction (Limited)	10 0 0	6 0 0	
551	10	Do., preference	10 0 0	6 0 0	
520	10				

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WANTED, Two or Three Practical Men, for the manufacture of Dry Gas-Meters.
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WANTED, by the Advertiser, a re-engagement on a Gas-Work. Understands manufacture, testing, main and service laying, fitting, &c.; also book-keeping and collecting. Good references.
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WANTED, a Second-hand Beale's EXHAUSTER, complete, to pass 10,000 feet per hour.
Full particulars, with lowest price, to J. H. MASON, NEWBURY.

MR. THOS. HARVEY, late Foreman at the Woolwich Gas-Works, seeks a re-engagement as FOREMAN or MANAGER at a small Gas-Work. Sixteen years character.
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A GENTLEMAN, well connected with Gas and Water Works, desires to be engaged as TRAVELLER, or to take the Management of a Work.
Letters to be addressed to Mr. MOORHOUSE, Gas and Water Works, CANTERBURY. Satisfactory references.

FOR SALE, at the Ratcliff Gas Company's Works, New Crane, Wapping, a number of 10-in. and 12-in. Cast-Iron CONNEXIONS, and a quantity of useful VALVES of same size, and of Bryan Donkin's pattern. They will be sold cheap to clear off surplus stock.
Apply to Mr. H. E. JONES, on the premises.

FOR SALE, by private Contract, a Six horse horizontal high-pressure STEAM-ENGINE, with Cornish boiler complete, including countershaft cog-wheels, and pumps.
Apply to Messrs. WOOLBRIDGE AND SONS, Solicitors, WINCHESTER.

GAS-WORKS.

TO BE LET, a Company with Limited Liability. The Proprietors of Gas-Works in a small market town in the East of England are desirous of leasing the same for a term of years.
Any person willing to treat will be put into direct communication with the Secretary, and furnished with all particulars, on addressing a letter to Y. Z., Messrs. Harwar and Co., Furnival's Inn Gateway, Holborn, LONDON, E.C.
N.B.—None but Principals or their Solicitors will be treated with.

EDWD. SANDELL, Public Accountant and Auditor, 4, Skinner's Place, Size Lane, LONDON.
The projector of the *Gas Companies Analyzed Expenditure Account-Book* offers his experience and services in the examination, preparation, and production of all accounts in reference to Gas Companies. References if required.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20 & 22, WHARF ROAD,
CITY ROAD, LONDON, N.,
Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.
N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. CHARLES HORSLEY, Agent.

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Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS TILES, and every description of FIRE-BRICK.
Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.
Successors to
E. BAKER AND CO., LATE BRIERLEY HILL, STAFFORDSHIRE.

IMPERIAL CONTINENTAL GAS ASSOCIATION.
(INCORPORATED BY ACT OF PARLIAMENT.)
The HALF-YEARLY ORDINARY MEETING of the Imperial Continental Gas Association was held at the City Terminus Hotel, Cannon Street, London, on TUESDAY, the 29th inst., Philip Twells, Esq., the Chairman, when the following Resolutions were passed:—
Resolved unanimously—"That the report upon the affairs of the Association now read be received and entered on the minutes."
Resolved unanimously—"That a dividend of £2 per share be declared upon the 56,000 shares of the Association, for the half year ended the 30th of June last; and that the said dividend be payable, free of income-tax, on and after the 15th of December next."
"That the cordial thanks of the meeting be given to the President and Directors for their able management of the affairs of the Association, and to the Chairman for his conduct in the chair."
"That the thanks of the Proprietors be given to Mr. Drory, the General Superintendent of the affairs of the Association on the Continent, for the ability with which he attends to the business of the stations."
By order of the Board of Direction,
ALBERT F. JACKSON, Secretary.
30, Clement's Lane, Lombard Street,
London, Nov. 30, 1870.

LAW UNION
FIRE & LIFE INSURANCE COMPANY.
CHIEF OFFICE:
126, CHANCERY LANE, LONDON, W.C.
Capital—ONE MILLION STERLING,
Fully subscribed by upwards of 450 Shareholders, nearly all of whom are members of the Legal Profession.
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DEPUTY-CHAIRMAN—JAMES CUDDON, Esq., Barrister-at-Law, Goldsmith Building, Temple.
The Capital subscribed and Funds in hand amount to upwards of £1,250,000, affording unquestionable security. The Directors invite particular attention to the new form of Life Policy, which is free from all conditions.
The Company advances money on Mortgage of Life Interests and Reversions, whether absolute or contingent.
Gas-Works insured against Fire and Explosion, and Coals against Spontaneous Combustion.
Rates of Premium from 2s. to 10s. 6d.
Prospectuses, copies of the Directors' Report and Annual Balance-Sheet, and every information sent post free on application to
FRANK M'GEDY, Actuary and Secretary.

CONSULTING GAS ENGINEERS.
MESSRS. GEORGE HEDLEY & CO.,
5, GEORGE STREET, WOLVERHAMPTON,
Advise upon PARLIAMENTARY ARBITRATIONS, and all matters connected with Gas.
Plans and Specifications prepared for the Erection and Alteration of Works.

New edition, 6th thousand, 6d., post free from Author,
GAS ECONOMY. Things worth know-ing, &c. By R. O. FERRIER, Edinburgh. "Invaluable to gas consumers." "Rights and duties of manufacturers and consumers fairly stated." *Mirror of Science, Engineer, &c.*
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CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.
For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.
For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

CAST-IRON Retorts, Socket-Pipes, with Syphons, and all requisite Connexions, Lamp Columns, Wrought-Iron Tubing, Valves, Street-Lamps, Sight Holes, Furnace Doors, Ash-Pans, Charging and Coke Shovels, Iron Pails, Coke Barrows, Cross Bars, Fire Pots, Pumps, and Iron Borings.
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Mr. LYNCH WHITE'S,
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TO INVENTORS AND PATENTEES.
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Manufacturer of Clay Retorts, Fire-Bricks, and every description of Fire-Clay Goods.

OXIDE OF IRON.—
We are prepared to supply, on moderate terms,
HYDRATED PEROXIDE OF IRON (BOG OCHRE),
Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.
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WATER-WORKS FITTINGS,
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METERS, STEAM FITTINGS,
GAS & HOT-WATER VALVES, &c.,
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SUN BURNERS, GAS CHANDELIERS,
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And every Description of
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FIRE-BRICKS, LUMPS, TILES, RETORTS,
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SWANWICK CANNEL.
The yield of this Cannel is liberal, the illuminating power large, and coke good.
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GLASGOW,
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STATION-METERS with PLANED JOINTS,
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All of which may be had with
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Of which W. & B. C. are the Sole Manufacturers.

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Possess a simplicity of construction and facility for repair greater than any yet produced, while the excellence of the material and workmanship, and accuracy of registration, cannot be surpassed. The superiority of their Dry Meters in Tin Cases is also well known, having stood the test of years.

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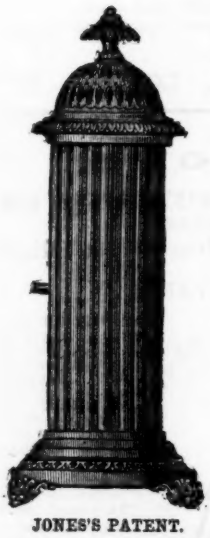

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Yield of gas per ton . . .	10,296 cubic feet.
Illuminating power rather over	21 sperm candles.
Yield of coke per ton . . .	12 cwt.

The actual working, as reported by one of the largest gas companies in Yorkshire, gives results still more favourable, viz.—

Yield of gas	10,416 cubic feet.
Illuminating power	21·89 sperm candles.
Coke	The same.

We add from the same source the capabilities of the common gas coal—

Yield of gas	10,080 cubic feet.
Illuminating power	14·41 sperm candles.
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CANNEL COAL.

MESSRS. GRIFFITHS BROTHERS,
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Beg leave to call the attention of Gas Companies to the superior quality of their Cannel for gas-making purposes.

This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

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HUCKNALL COLLIERY COMPANY
Can offer a CANNEL COAL yielding a large quantity of Gas of superior quality.

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PIPES, VALVES, IRON ROOFS,
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WILLIAM FRASER, Inverkeithing (owner of the Works at which Fire-Clay Retorts were first made), having greatly enlarged his Works, can supply RETORTS and other FIRE-CLAY GOODS to any extent.

References can be given to managers of above a hundred Gas-Works whom he supplies.

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INTERNATIONAL EXHIBITION, 1862.
CLASS X.
PRIZE MEDAL
For excellence of Fire-Clay Gas Retorts, and
"HONOURABLE MENTION" for good quality of Fire-Bricks.
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THROCKLEY,
NEWCASTLE-ON-TYNE.

J. T. B. PORTER & CO.,
GAS ENGINEERS,
MANUFACTURERS AND CONTRACTORS FOR GAS-WORKS
Of any extent at Home and Abroad,
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WET & DRY GAS-METERS, STATION-METERS, GOVERNORS, &c.
SOLE MANUFACTURER OF
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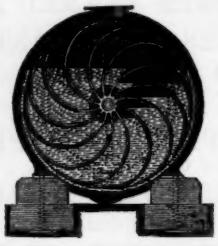
For ensuring any required consumption. These Regulators are in general and increasing use, and references can be given to Gas Companies who use them for every Lamp.



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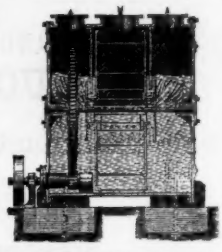

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R. D. recommends his Fire-Brick Retorts to Engineers and Managers of Gas Companies; they last from 10 to 12 years.

Iron and Fire-Clay Retorts.
Annular and Pipe Condensers.
Scrubbers and Purifiers, all sizes.
Steam-Engines and Exhausters.
Hydraulic Centre-Valves.
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Gasholders, Single-Lift or Telescopic.
Gas Castings of every description.
Retort Setters and Fitters sent to all parts of the country.
Wood Sieves for Purifiers.

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Also, EVERY DESCRIPTION OF GAS APPARATUS,
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Gas Companies advised on Improvements, Extensions, and Alteration of Works.
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Vestibules, Iron Barrel, Composition Tubing, Dry & Wet Meters, & Gas-Fittings
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Special Designs prepared in perfect accordance with architectural arrangements. Estimates furnished for the Lighting and Fitting up of Theatres, Music Halls, and Public or Private Building with Gas.

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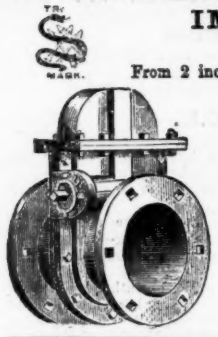
IMPROVED GAS-VALVES
WITH WROUGHT-IRON PINIONS,

From 2 inches to 18 inches, price 9s. 6d. to 12s. per inch diameter.



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These Valves are all proved on both sides to 30 lbs. on the square inch before leaving the works, and are always kept in stock.

VALVES MADE WITH OUTSIDE RACKS TO ORDER.
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Mr. Fraser having had more than Twenty years experience in the Construction, Alteration, and Management of GAS and WATER WORKS, will be happy to furnish information on all matters appertaining thereto.

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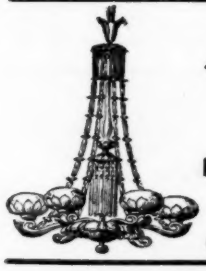

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MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,
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TABLE GLASS OF ALL KINDS.
CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

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RETORT SETTINGS, heated by tar without the production of smoke.
STEAM-ENGINES and EXHAUSTERS, separately or combined.
FOUR-WAY VALVES, one of which is equal to three ordinary Valves.
STATION GOVERNORS—the Gasholder cannot tilt and cause accident.
BREEZE AND TAR FUEL MACHINE.

A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress on the construction of Works, post free, 2s. 6d.

N.B.—The second edition of this Work, *now ready*, contains illustrations of the Machine for converting Breeze and Tar into Fuel for heating the Retorts.

"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artizan.*

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LIVER FOUNDRY, SALFORD,
MANUFACTURERS OF
SLUICE-VALVES & HYDRANTS,
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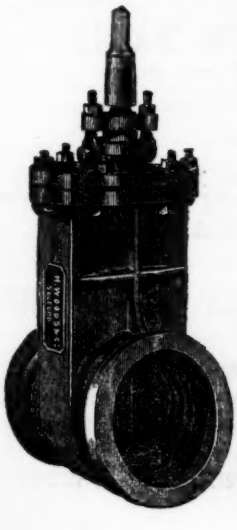

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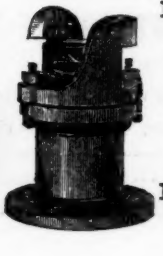

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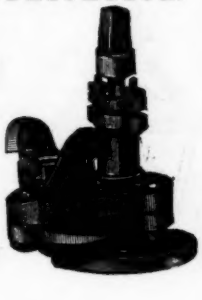

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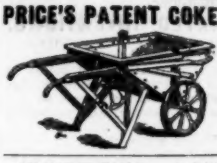

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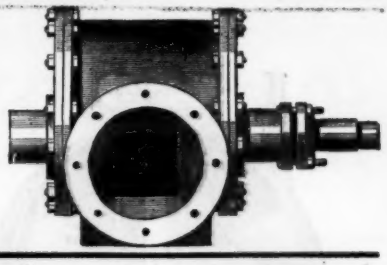

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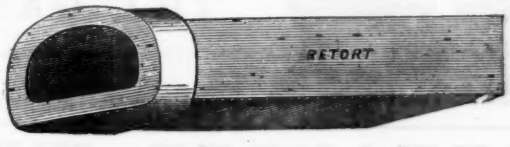

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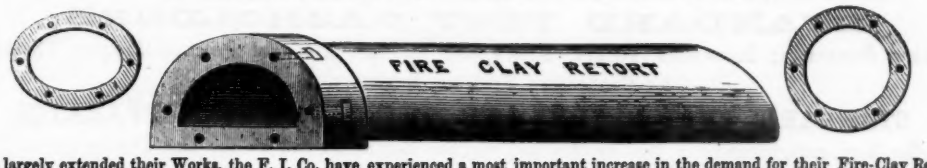

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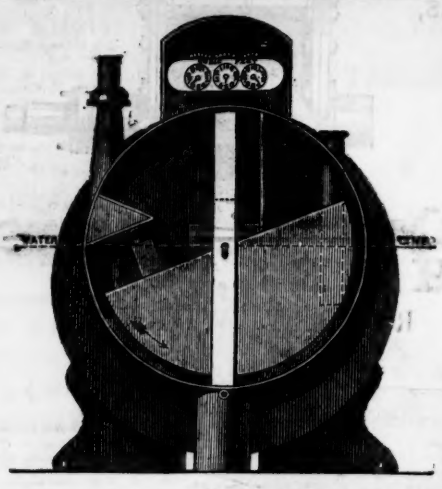

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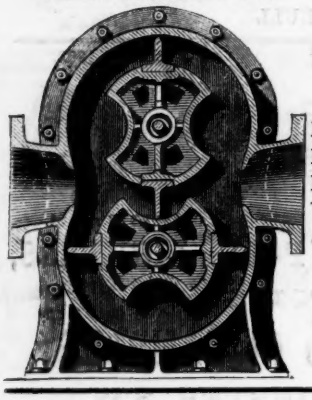

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